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NOAA Technical Report NMFS SSRF-682

Heat Exchange Between Ocean and Atmosphere in the Eastern North Pacific for 1961-71

N. E. CLARK, L. EBER, R. M. LAURS,
J. A. RENNER, and J. F. T. SAUR

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UNITED STATES
DEPARTMENT OF COMMERCE
Frederick B. Dent, Secretary

NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION
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National Marine
Fisheries Service
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ABSTRACT

Summaries of large-scale heat exchange between ocean and atmosphere in the eastern North Pacific Ocean are presented for the period 1961 through 1971. The summaries are based on computations made from synoptic marine radio weather reports and include 1) monthly values of total heat exchange and departures from a long-term mean; 2) long-term monthly mean values of the total heat exchange, incoming solar radiation, effective back radiation, and evaporative and sensible heat transfer; and 3) annual cycles of total heat exchange for selected areas.

Outstanding spatial and temporal features of the heat exchange values are discussed. However, little detail is given since this is a summary report, and readers can draw their own conclusions depending upon the intended use of the charts.

Comparisons are also made between the total heat exchange values and those given in two other reports. Discrepancies between values given in this report and those published in the other reports are attributed to differences in the empirical equations used to make the heat exchange computations, differences in data processing techniques, differences in the observed data used in the computations due to different methods of acquisition, and the possibility of ocean climate changes.

INTRODUCTION

The ocean's thermal structure is an important environmental variable that affects the distribution and abundance of marine fish populations (Sette, 1961; Uda, 1957, 1961). As part of a fisheries oceanography research program directed towards fisheries prediction, ocean temperature conditions and the air-sea interaction processes which are most often responsible for changes in this structure have been monitored in the eastern North Pacific since 1960. These data have been used to describe the interaction of ocean and atmosphere (Clark, 1972; Namias, 1969, 1971) in the eastern North Pacific and to identify and attempt to understand those ocean features that are important determinants of tuna distribution (Johnson, 1962; Flittner, 1970). They are also being used to evaluate the role of changing ocean conditions on other fish populations.

This report is a contribution to the MARMAP program of the National Marine Fisheries Service and presents summaries for use by fishery and other marine scientists of the derived heat exchange between ocean and atmosphere in the eastern North Pacific Ocean bounded by lat. 20° and 60°N and long. 115°W and 180° for the period 1961-71. The summaries were computed by 5° latitude-longitude quadrangles and are presented in charts of 1) the monthly values of total heat exchange and differences from the long-term mean; 2) the long-term monthly means of the total heat exchange, incoming solar radiation, effective back radiation, and evaporative and sensible heat transfer; and 3) the annual cycles of total heat exchange in selected areas.

Since air-sea interaction processes cannot, in general, be measured directly except for solar radiation, for which there are very limited measurements over the oceans, quantitative evaluation of these processes depends upon computations based on empirically derived formulas. Because these formulas are still the subject of extensive research, the heat exchange computations should be considered only as relative indices of the magnitude of the heat flux across the air-sea interface. However, we believe that the computations represented by the charts in this report can be used to evaluate large-scale features and to show year-to-year and month-to-month variations of this heat flux.

SOURCE AND DISTRIBUTION OF THE DATA

The source of data used in preparing the charts in this report is the synoptic marine radio weather report made by ships at sea. Cooperating American and foreign-flag vessels make, record, and transmit the standard marine weather observations according to established procedures set up by the World Meteorological Organization (WMO). Observations taken at 0000, 0600, 1200, and 1800 Greenwich Mean Time daily are transmitted to designated commercial and government radio stations around the world.

Between 8,000 to 10,000 synoptic marine weather observations from the eastern North Pacific are processed by computer each month at the National Marine Fisheries Service La Jolla Laboratory, and

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several summaries are compiled depending on their intended use. For a more detailed description of how the observations are received and processed, see Johnson, Flittner, and Cline (1965). Although specific program details have been changed, the present processing methods are essentially the same as those described in that publication.

Because the data are compiled from merchant and fishing vessel marine weather reports, the spatial and temporal distributions of observations over the ocean are irregular. Observations are most numerous in the major shipping lanes from San Francisco to Hawaii, from San Francisco to Japan, from Panama to San Diego, Los Angeles, and San Francisco, and from Seattle to Japan. Shipping lanes of secondary importance are from San Diego to Hawaii and Panama to Hawaii.

The average number of marine synoptic observations taken per month over the period 1961-71 by 5° quadrangles for the winter and summer seasons is shown in Figures 1a and 1b, respectively. The density of observations is shown in class intervals of 50 as indicated on the charts. Compilations made for the spring and fall seasons show the density distributio for spring similar to that of winter and the densit distribution for fall similar to that of summer.

In all seasons, most observations are taken alon the shipping lane between San Francisco and Hawa and the coastal route from Panama to U.S. west coas ports. The least number of observations are take northwest of Hawaii and between lat. 25° and 30°N during the summer season. The main difference be tween the winter and summer distributions is th southward shift of greatest observation density west long. 145°W from the great circle route to Japan durin summer to between lat. 30° and 35°N during winter.

INITIAL DATA PROCESSING AND CHAR PREPARATION

Marine Environmental Variable and Heat Exchange Summaries

An intermediate step between reception of th synoptic marine data and preparation of the char presented in this report is the compilation by 5° quad rangles of monthly mean marine synoptic variable

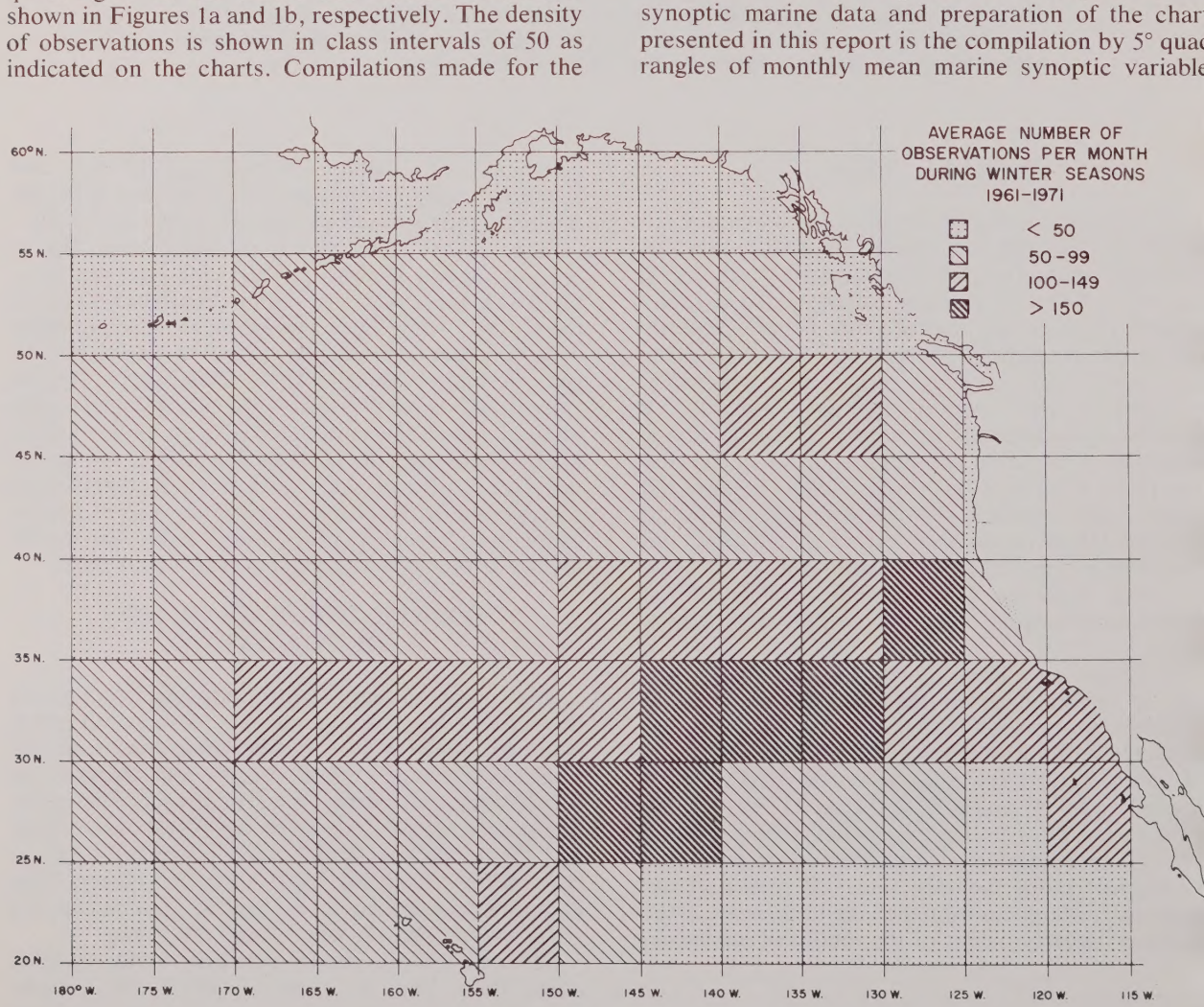

Figure 1a.—Average number of observations per month during winter seasons for 1961-71.

and heat exchange values that are computed from the ariables. The initial output format consists of a deck f computer cards which are sorted and reprocessed in order to display the values in a geographic format. Each of the variables and heat exchange terms (described below) is printed in this format after three ummaries have been made: 1) long-term mean monthly values computed over the years 1961-71; 2) monthly mean values computed for a given month and ear; and 3) deviations of a value for a given month nd year from the long-term monthly mean, i.e., anomaly values.

eat Exchange Computations

For a given area and time period, the equation for he energy exchange at the air-sea interface is $Q_t = io - Q_r + Q_b + Q_e + Q_s$. Energy exchange calculaons presented here do not take into account changes n heat brought about by advection.

Q_{io}, the incoming solar radiation corrected for oud cover (cal/cm²/day), is determined from the folwing equation proposed by Berliand (1960):

$$Q_{io} = \text{(Berliand table)}\ (1 - aC - bC^2)$$

where C = cloudiness in tenths;
b = 0.38; and
a = a function of latitude.

Berliand's table, which lists values by month and latitude of incoming solar radiation with a clear sky, and values of "a" are given in Johnson et al. (1965).

Of the incoming radiation corrected for the screening effects of cloud cover, some is reflected at the sea surface. The amount reflected depends on the latitude and time of year and is computed from

$$Q_r = Q_{io} \cdot r$$

where r = percentage of radiation reflected given in a table by Budyko (1956). The percentage varies from about 6% in low latitudes to more than 20% in high latitudes in winter. In preparing the charts, Q_{io} and Q_r were combined in a single term Q_i, the incoming radiation corrected for cloud cover and reflection, defined by $Q_i = Q_{io} - Q_r$.

Effective back radiation, Q_b (cal/cm²/day), is the difference between long-wave radiation from the sea surface and long-wave radiation from the atmosphere. The following semiempirical equation proposed by

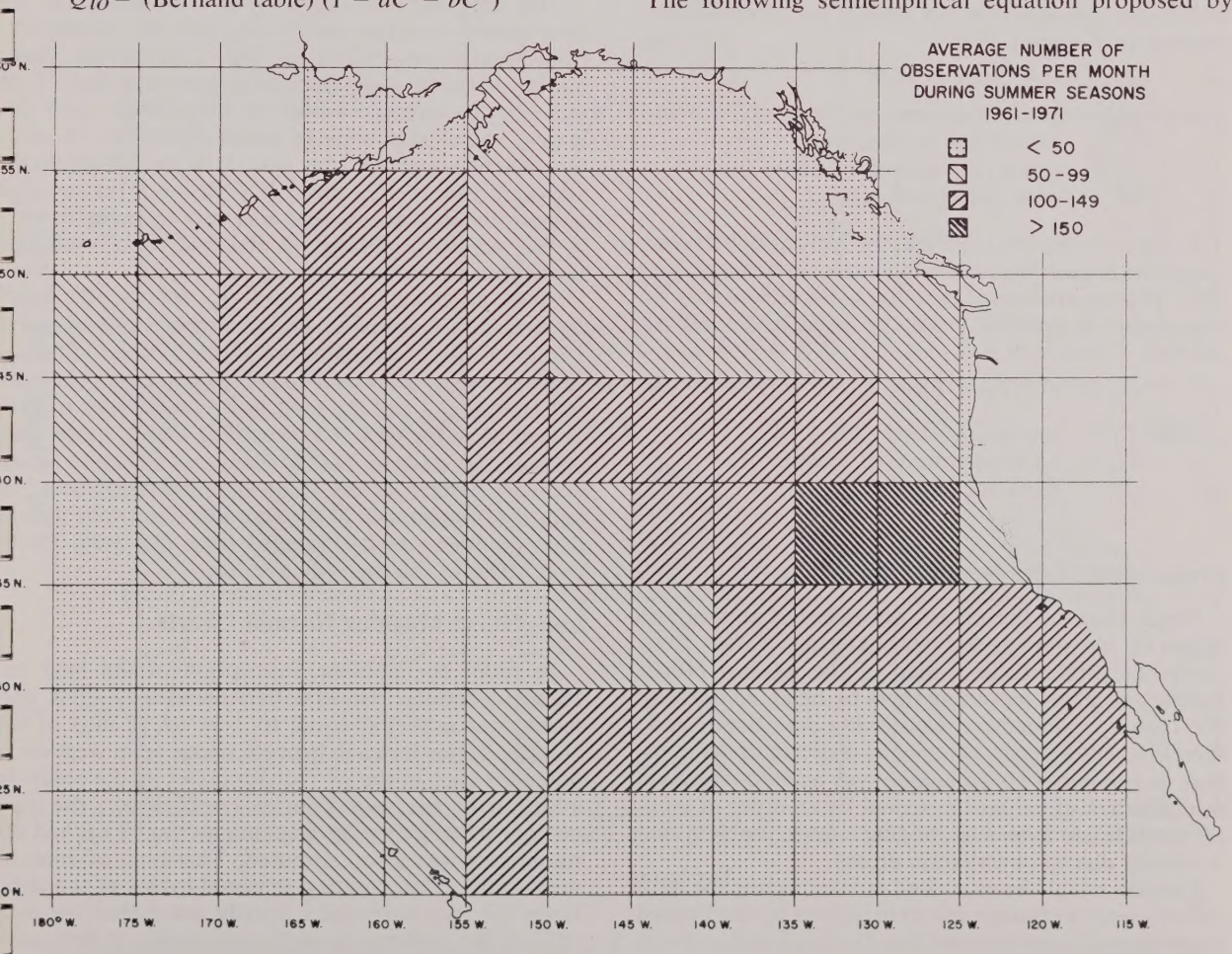

Figure 1b.—Average number of observations per month during summer seasons for 1961-71.

Berliand and Berliand (1952) has been used in this study:

$$Q_b = -\left[s\sigma(\theta_s)^4(0.39-0.050\sqrt{e_a})(1-kC^2) + 4s\sigma\theta_s^3(\theta_s-\theta_a)\right]$$

where s = 0.97 (the ratio of the radiation of the sea surface to a black body);
θ_s = absolute sea surface temperature (°K);
θ_a = absolute air temperature (°K);
σ = 1.175×10^{-7} (the Stefan-Boltzmann constant);
e_a = vapor pressure (mb);
k = a function of latitude (values given in Johnson et al., 1965);
C = cloudiness in tenths of celestial dome covered.

Additional energy enters or leaves the sea surface as evaporation (Q_e) and sensible heat (Q_s). Evaporation depends upon 1) the velocity of the wind and the vapor pressure difference between the sea surface and air above it, and 2) a coefficient of proportionality. The coefficient of proportionality used in our computations is given by Tabata (1958):

$$Q_e = -4.70\,(e_s - e_a)W$$

where e_s = saturation vapor pressure at temperature of sea surface (mb);
e_a = vapor pressure of air (mb); and
W = wind speed (m/sec).

Bowen (1926) established the relation between evaporation and the heat conduction at a water surface. The equation used here for sensible heat loss by the ocean is derived from the relation found by Bowen:

$$Q_s = -3(T_s - T_a)W$$

where T_s = sea temperature (°C);
T_a = air temperature (°C); and
W = wind speed (m/sec).

Preparation of the Heat Exchange Charts

Preparation of the charts presented in this report began by transferring the heat exchange values from computer printouts to a map of the eastern North Pacific and then contouring them by hand. In drawing the isolines, subjective smoothing was used, and, therefore, the lines do not always conform to the numbers as printed. This technique was used to eliminate the influence of values that could be an order of magnitude different from surrounding ones, a problem that is usually due to observation errors.

Caution should be exercised in interpreting the individual energy exchange values in regions having limited observational coverage (see Fig. 1a, 1b). Small errors in observation and transmission can cause large errors in some of the computations. In quadrangles having few observations, considerable bias can be introduced b the relative positions of the reporting ships and thei timing with respect to the calendar month. All compu tations presented assume the data centroid to be at th center of each respective quadrangle and for the middl of the month. Energy exchange calculations were nc made for 5° quadrangles having fewer than five obse vations per month.

CHARTS PREPARED FROM THE HEAT EXCHANGE COMPUTATIONS

Monthly Average and Anomaly Charts

Monthly averages and anomalies of the total (ne heat exchange, Q_t, across the air-sea interface ar shown for each month of the 11-yr period, 1961-71, i Part 1 of the chart section. A detailed description c these charts will not be given since readers can dra their own conclusions depending upon the intende use of the charts. However, some remarks will b made concerning spatial characteristics and mag nitudes of the Q_t anomaly patterns.

The anomaly patterns of total heat exchange Q vary widely over the chart for a particular month an from month-to-month during the 11-yr period. Mag nitudes of the Q_t anomalies range from less than 1% c the monthly average values to over 200%, with th largest values occurring in summer months. In add tion, there appears to be very little month-to-mont persistence in the Q_t anomaly patterns. This result not surprising, since there is also very little persistenc in the anomaly patterns of the four heat exchang terms that determine Q_t.

Since anomalies of Q_i and Q_b are usually sma compared to those of Q_e and Q_s, spatial and tempor variations in Q_t anomalies are primarily due to fluctu tions of evaporative and sensible heat flux. Anoma patterns of Q_e and Q_s tend to be fairly large in ge graphical scope and coherence; at times, more tha 50% of the eastern North Pacific is covered by a anomaly pattern of the same sign and magnitude. I addition, magnitudes of the anomalies can vary widel from month-to-month, ranging from less than 1% t over 100% of the monthly average.

Long-Term Mean or Normal Charts

In order to facilitate description of the heat e change normals, the first two harmonics (first ha monic has a period equal to 1 yr or 12 mo) of th Fourier Series for each heat exchange term were cor puted for each of the 93 5° quadrangles on the chart. I addition to the two Fourier coefficients, the pe centage of series variance accounted for by each of th harmonics was also computed. This type of analys was useful in interpreting seasonal cycles of the dat since the two harmonics usually accounted for ov 95% of the variance in each quadrangle; in fact, ov most areas of the chart the first harmonic or year cycle accounted for over 90% of the variance. By d

termining the phase of the harmonics, it was also possible to compare relative times of maximum and minimum values of each series.

Part 2 of the chart section shows the long-term mean monthly values (normals) of the total heat flux across the air-sea interface, $\overline{Q}_t$. Negative values of $\overline{Q}_t$, implying heat loss from the ocean surface, occur from September through March, while positive values, implying heat gain by the surface layer, occur from March through September. A regular yearly cycle is found in the $\overline{Q}_t$ series with maximum values occurring in June and minimum values in December.

Part 3 of the chart section shows the normal values of net incoming solar radiation, $\overline{Q}_i$. As expected, a regular yearly cycle is found in the $\overline{Q}_i$ series with maximum values in each quadrangle occurring in June and minimum values in December due to the motion of the earth around the sun and the tilt of the earth's axis of rotation with respect to the plane of revolution.

Part 4 of the chart section shows the effective back radiation, $\overline{Q}_b$. A regular yearly cycle is also found in the $\overline{Q}_b$ series. Maximum values occur in December and January due to the relatively low values of air vapor pressure and large values of sea-air temperature differences during these months, while minimum values occur in June and July.

Part 5 of the chart section shows the normal values of evaporative heat transfer between ocean and atmosphere, $\overline{Q}_e$. A pronounced yearly cycle is found in the $\overline{Q}_e$ series with maximum values occurring in December and minimum values in June. Negative values of $\overline{Q}_e$ occur in all months, reflecting the fact that on the average sea-air vapor pressure differences are positive throughout the year.

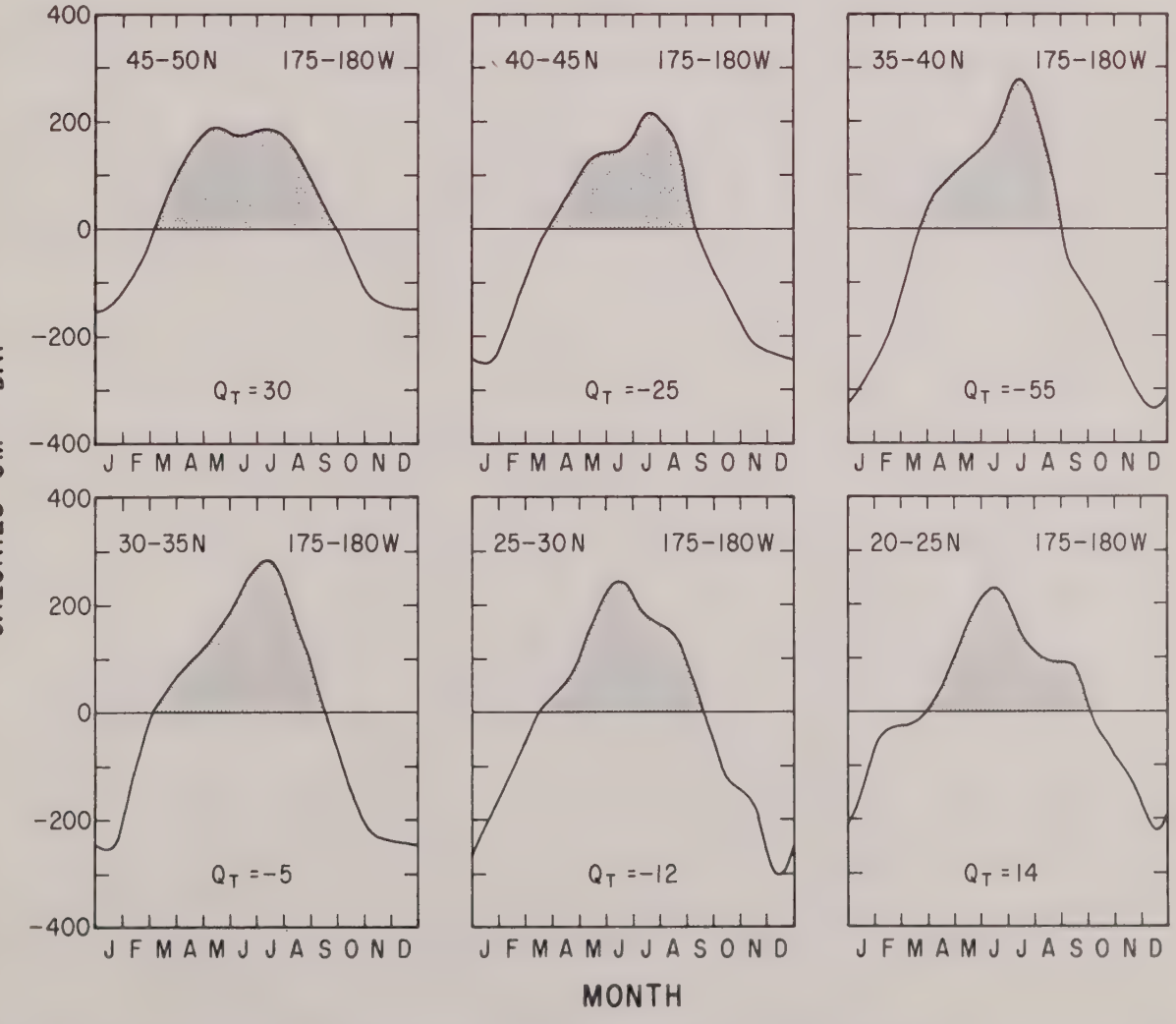

Plate 1.—Seasonal variation of average monthly total heat exchange, $\overline{Q}_t$, by 5° quadrangles from lat. 20° to 50°N in the meridional strip long. 175°W to the 180° meridian. Q_T is the average annual total heat exchange.

Part 6 of the chart section shows the normal values of sensible heat transfer between ocean and atmosphere, $\overline{Q}_S$. A regular yearly cycle is also found in the $\overline{Q}_S$ series with maximum values occurring in November and December and minimum values in May and June. Positive values of $\overline{Q}_S$ (heat gained by sea surface) occur in high latitudes from April through September, reflecting the fact that air temperatures in this region of the eastern North Pacific are warmer than sea temperatures during these months.

The yearly cycles in $\overline{Q}_e$ and $\overline{Q}_S$ reflect the fact that sea-air temperature and vapor pressure differences and observed wind speeds also have regular yearly cycles with maxima and minima that occur at the same times as those of the heat flux terms.

Seasonal Variation of the Normal Total Heat Exchange

The seasonal variation of the 1961-71 normal monthly total heat exchange, $\overline{Q}_t$, was plotted for eac 5° quadrangle and the annual average computed fro

the equation, $Q_T = \frac{1}{12} \sum_{i=1}^{12} \overline{Q}_{ti}$,

where i represents the month. Except in the nea coastal region of North America, the character of th normal seasonal variation changes less with latitud than with longitude. Therefore, for the oceanic regio lat. 20° to 50°N and long. 130°W to 180°, the seasona curves and the average annual values are shown her for only three selected meridional strips. Plate 1 show the seasonal variation for each 5° quadrangl in the longitudinal strip between long. 175°W an 180° at the western boundary of the area. Similarly Plate 2 represents the area between long. 150° an 155°W northward from Hawaii toward Kodiak, an Plate 3 represents the area between long. 130° an

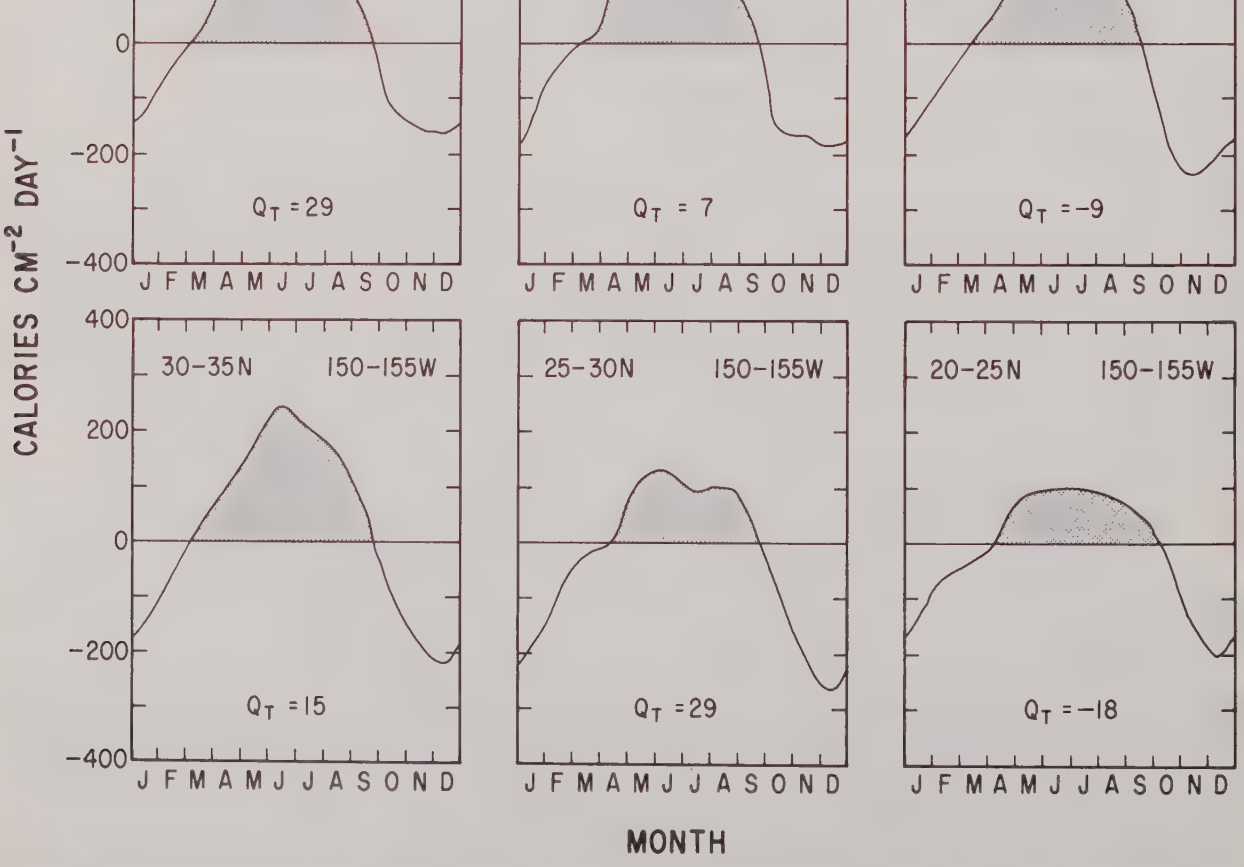

Plate 2.—Seasonal variation of average monthly total heat exchange, $\overline{Q}_t$, by 5° quadrangles from lat. 20° to 50°N in the meridional strip long. 150° to 155°W. Q_T is the average annual total heat exchange.

135°W just westward of the strong influence of the continental boundary. Plates 4 and 5 show the seasonal variation in 5° quadrangles in coastal regions from the northern Gulf of Alaska to Washington and from Oregon to Baja California, respectively.

The general character of the seasonal variations can be described in terms of the average annual net heat exchange, the range of the variations and the months in which the maximum and minimum values occur. In the open ocean, lat. 20° to 50°N and long. 130°W to 180°, the distribution of average annual net heat exchange, Q_T, is highly zonal with the largest (positive) values occurring in the lat. 45° to 50°N band. To the west of long. 155°W a secondary maximum appears in the lat. 30° to 35°N band. The maximum seasonal *range,* nearly 600 cal/cm²/day, occurs in the lat. 35° to 40°N, long. 175°W to 180° quadrangle. The lowest seasonal ranges (205 to 230 cal/cm²/day) occur in the lat. 20° to 25°N band between long. 125° and 145°W. The maximum monthly heat exchange (greatest rate of heat gain by the ocean) occurs in June in all but a few quadrangles where peak gains are in May or July and with the exception of the area from Baja California west to long. 140°W in which August maximums dominate. Minimum values (greatest rate of heat loss from the ocean) generally occur in December except for a few quadrangles with November or January minimums.

In the coastal regions the ranges of the average seasonal variation are consistently large, from about 430 to 525 cal/cm²/day from the Gulf of Alaska to the central California coast. In the northern portion of the section the annual average Q_T is negative. In the absence of declining average annual sea temperatures, a negative annual Q_T implies that heat is transported into the region by currents. Similarly, in the southern region, in the absence of increasing average annual sea

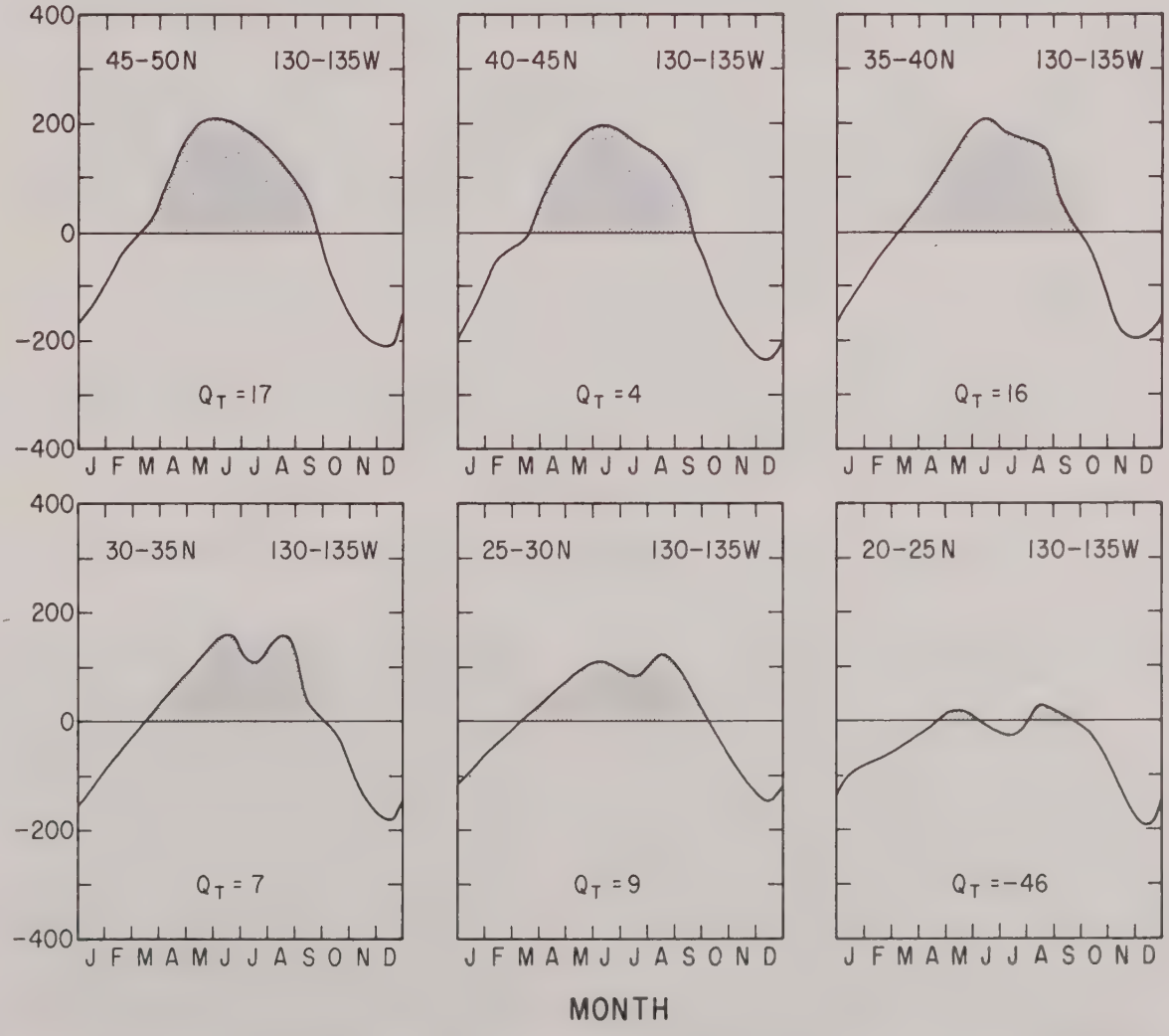

Plate 3.—Seasonal variation of average monthly total heat exchange, $\overline{Q}_t$, by 5° quadrangles from lat. 20° to 50°N in the meridional strip long. 130° to 135°W. Q_T is the average annual total heat exchange.

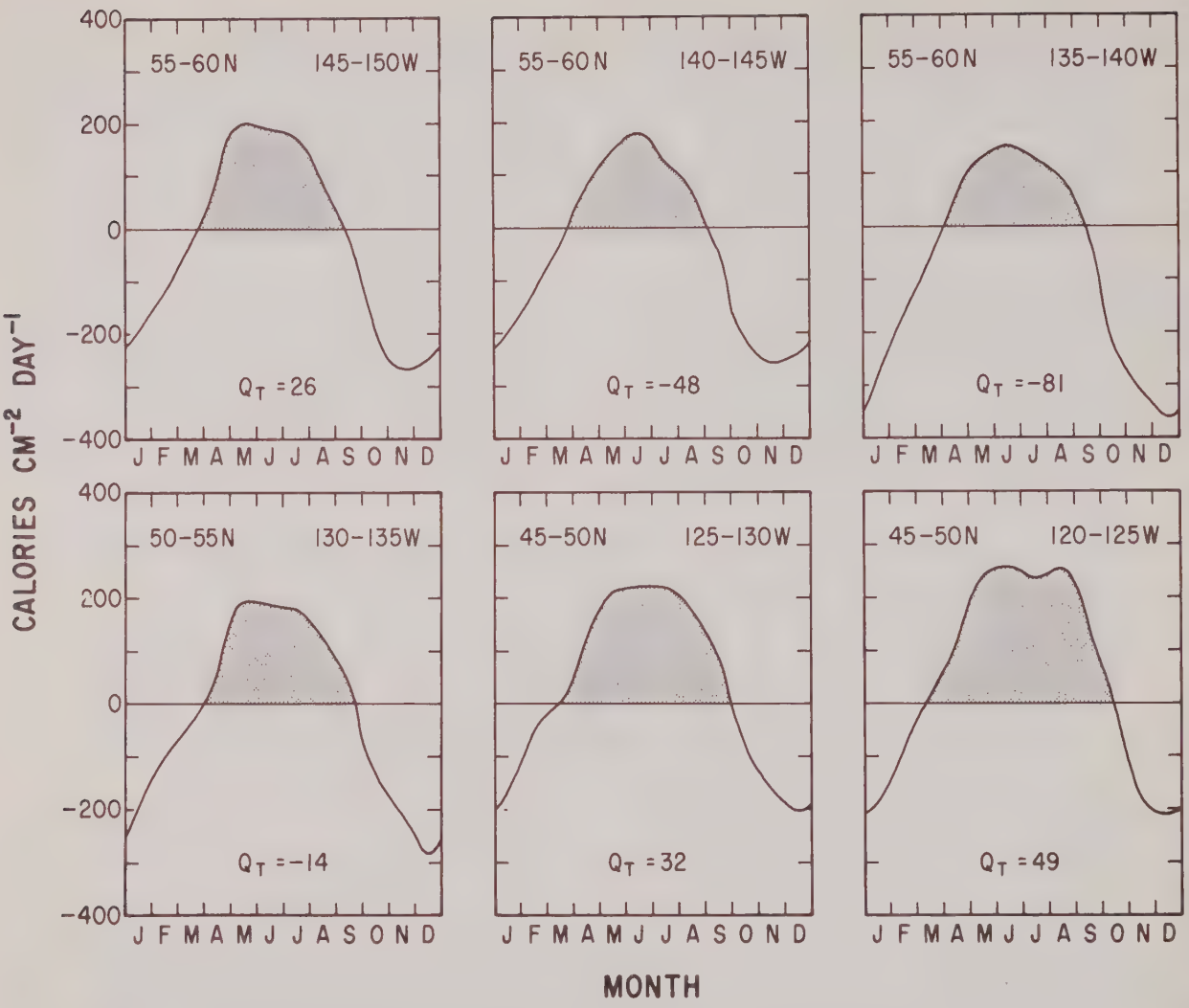

Plate 4.—Seasonal variation of average monthly total heat exchange, $\overline{Q_t}$, in coastal regions from northern Gulf of Alaska to Washington. Q_T is the average annual total heat exchange.

temperatures, a positive annual Q_T implies that heat is extracted from the region by currents.

EVALUATION OF THE CHARTS

The validity of these charts as quantitative representations of heat flux across the sea surface is subject to the quality and geographical coverage of the source data, the accuracy of the empirically derived formulas used for computation and the method of processing. Seckel (1970) has made a thorough analysis of each of these factors in producing a 2-yr series of monthly heat exchange tabulations by 5° quadrangles for the North Pacific trade wind zone. Seckel's tabulations provide an excellent set of heat flux values for comparison with those presented in this report.

Both were based on marine synoptic weather observations as the principal data source. However, for our report we utilized observations radioed ashore, while Seckel's data were derived from written logs archived by the National Weather Records Center.[2] Sets of data acquired by these two methods for particular areas and time periods will be similar but not identical due to card-punching and transmission errors and to the fact that not all data entered in weather logs are transmitted by radio, and not all observations reported by radio reach the archives.

Seckel's method of averaging the observations for each 5° quadrangle and month gave equal weight by 1° quadrangle and by day. These weighted averages of the variables needed for heat exchange computations were plotted on charts at the mean locations of the observa-

[2]Now the National Climatic Center, National Oceanic and Atmospheric Administration.

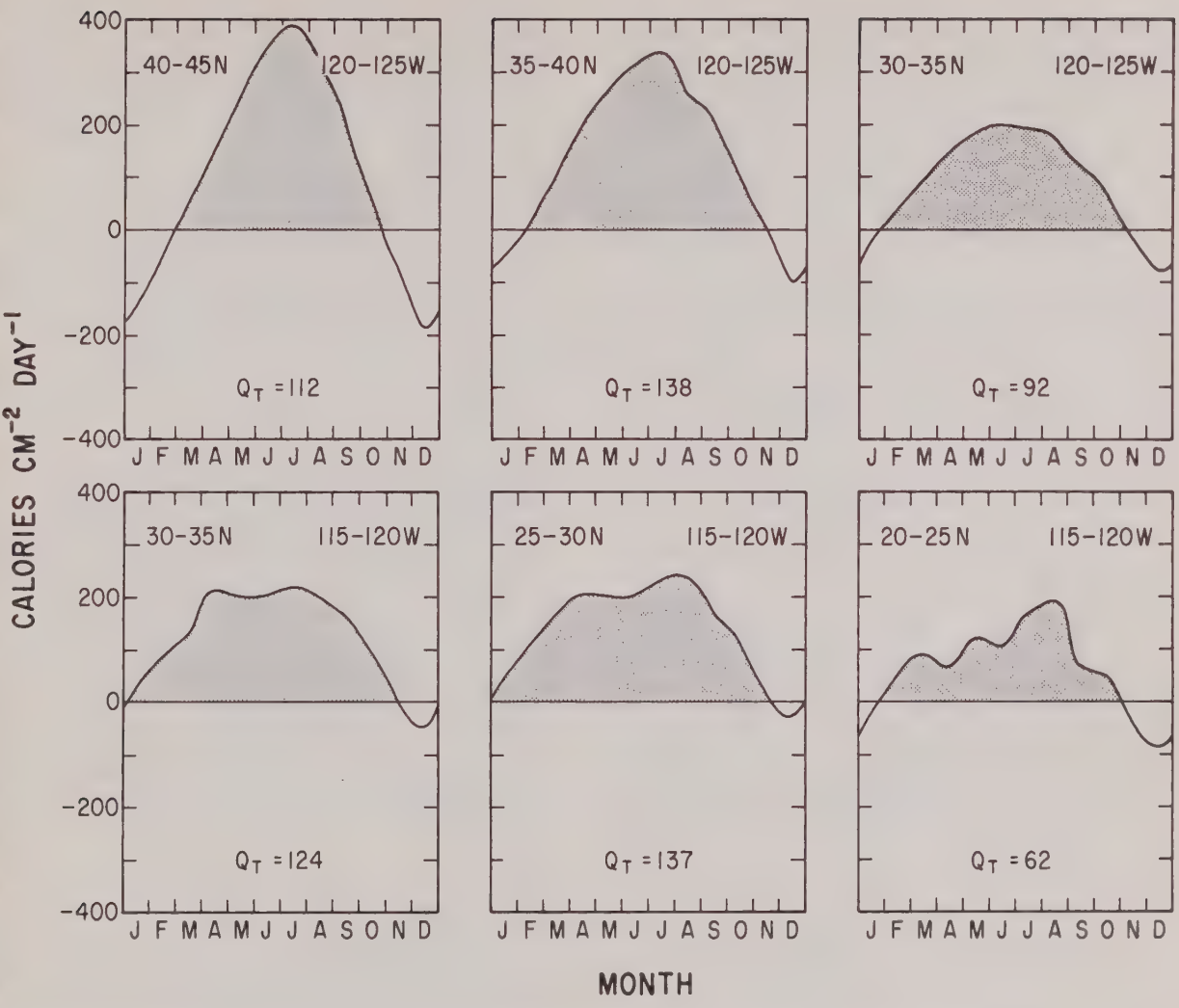

Plate 5.—Seasonal variation of average monthly total heat exchange, $\overline{Q}_t$, in coastal regions from Oregon to Baja California. Q_T is the average annual total heat exchange.

ons. The charts were then contoured and used to btain values of each variable at the centers of the 5° quadrangles by interpolation.

In the method of Johnson et al. (1965), which was sed in the preparation of this report, unweighted aver- ges of the meteorological variables for each 5° quad- rangle and month were used to compute the heat xchange components. The refinements employed in eckel's method improve the accuracy of his results because of the fact that obervations are concentrated along shipping routes and generally are not distributed venly in either time or space.

The empirical equations used by Seckel to compute the components of heat exchange differ in some re- spects from those used to obtain the results presented this report. The greatest difference occurs in the quations for heat loss through evaporation. Seckel used a variable drag coefficient which is formulated as a function of wind speed. His equation would give approximately the same values of evaporation as that of Johnson et al. (1965) at a wind speed of about 7 m/sec.

The equation for incoming radiation employing Berliand's table, used by Johnson et al. (1965), gives higher values of heat flux than the corresponding equation used by Seckel for equivalent conditions. Computed values of sensible heat conduction, on the other hand, would be 25% greater in magnitude using Seckel's equation due to a difference in constants. The equations used for effective back radiation are the same.

In consequence, discrepancies between values of total heat exchange given in this report and those published by Seckel may arise from differences in the empirical equations, from differences in processing techniques and from differences in the observational data

actually used for computation due to different methods of acquisition.

No attempt will be made to make a critical evaluation of these factors, however, a simple comparison of independently computed net heat flux values may be helpful in the utilization of the charts in this report.

The region studied by Seckel overlapped that represented by our charts from long. 130° to 170°W, between lat. 20° and 35°N. This comprises 24 5° quadrangles; consequently, 24 pairs of computed net heat flux values were available for comparison for each of the 24 mo of Seckel's series, which ran from July 1963 through June 1965.

The mean difference and the root mean square (RMS) difference of net heat flux for each 5° quadrangle are given in Table 1.

Positive differences are predominant and indicate that Seckel's values of net heat flux are larger. The RMS differences range from 40 to 106 cal/cm²/day and are generally smallest in areas having the most observations. The RMS difference for the entire sample is 72 cal/cm²/day.

Correlation coefficients were also computed for each 5° quadrangle from paired values of monthly heat flux over the 2-yr period. The results ranged from 0.93 to 0.98 for areas lat. 30° to 35°N, 0.88 to 0.95 for areas lat. 25° to 30°N, and 0.62 to 0.91 for areas lat. 20° to 25°N. Only three quadrangles had a correlation coefficient smaller than 0.86 which reflects the fact that the seasonal cycle of net heat flux, as represented by both sets of computations, is several times larger than the RMS differences. Furthermore, the apparent improvement of correlation with latitude reflects a increase in the seasonal range of heat flux northwar from lat. 20° to 35°N. The areas for which the correla tions were lowest were also the areas with the leas observations.

Averaging over larger areas reduces the effect o random variations which adversely affect the correla tion by 5° quadrangles between the two sets of val ues. Figure 2 shows Seckel's monthly total heat flu averaged for the entire region from long. 130° to 170°W and from lat. 20° to 35°N plotted against corresponding averages from our data. The correlation coefficient fo the 24 pairs of monthly averages is 0.99 indicating tha the effect of random differences has been essentially eliminated.

Systematic differences, however, are revealed b the regression line which crosses the horizontal axis a 12 cal/cm²/day, indicating that Seckel's formulas and processing technique give higher values of the tota heat flux. Also, the slope of the regression line differ from 1.0, indicating another systematic discrepanc that stems, at least in part, from Seckel's use of a drag coefficient which varies with wind speed in the equa tions for evaporation and sensible heat transfer. H formulation gives higher evaporative heat loss wit winds stronger than about 7 m/sec (other factors being equal) than those presented in this report, and lower evaporative heat loss with winds weaker than 7 m/sec

Wind speed frequencies tallied from tables in Seckel's report indicate that in the region and perio

Table 1.--Mean difference (upper value) and RMS difference (in parenthesis) of Q_t in cal/cm^2/day for 5° quadrangles

Lat. \ Long.	167° W	162° W	157° W	152° W	147° W	142° W	137° W	132° W
32° N	-34	-30	-16	-14	-1	9	36	30
	(101)	(96)	(63)	(38)	(51)	(54)	(48)	(40)
27° N	2	-3	21	39	26	39	26	9
	(106)	(55)	(79)	(80)	(52)	(69)	(59)	(51)
22° N	66	16	29	-5	-9	20	8	23
	(91)	(73)	(64)	(55)	(63)	(96)	(89)	(93)

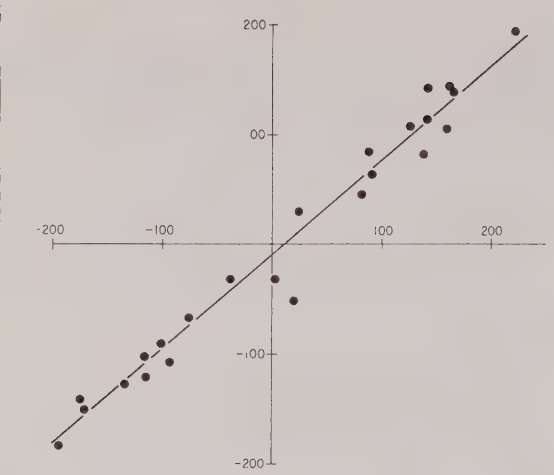

Figure 2.—Comparison of total heat transfer values (cal/cm²/day) taken from Seckel (horizontal axis) and this report (vertical axis). Each of the 24 monthly values for the period July 1963 to June 1965 was averaged over the region lat. 20° to 35°N and long. 130° to 170°W.

for which the comparison was made, wind speeds were less than 7 m/sec in about two-thirds of the cases for June through September and greater than 7 m/sec in about two-thirds of the cases for November through February. These factors combine to make Seckel's computed values of heat loss by evaporation lower than ours in the warming season and greater in the cooling season, which is reflected by his higher maximum and lower minimum values of net heat flux shown in Figure 2.

Computations of heat exchange at the sea surface have also been carried out by Wyrtki (1966) who prepared charts of heat loss by evaporation and of total heat exchange for the Pacific Ocean north of lat. 20°S. Wyrtki's charts are based on marine synoptic weather observations taken during the period 1947-60. The equations used for computation of the various components are equivalent to those described in this report, except for differences in certain empirical constants which give Wyrtki larger values of heat loss by evaporation and conduction under otherwise similar conditions. Wyrtki's method of data processing also differed from that of Johnson et al. (1965). Considering all circumstances, however, results obtained with the equations and procedures of Johnson et al. (1965) for a given set of data would probably agree as well or better with corresponding results from Wyrtki's method than with Seckel's.

Since Wyrtki's charts represent a time period antecedent to the 11 yr covered by our charts, they afford an opportunity to verify climatological patterns of net heat flux and, with caution, to infer changes in such patterns. We will make no attempt at interpretive comparison in this respect, other than to point out a few of the main characteristics in the mean cycle of heat exchange.

The beginning of the cooling season is first evident in September in the northernmost part of the Gulf of Alaska and in an area west of long. 155°W between lat. 35° and 45°N. However, large positive heat flux values still occur at this time of year along the North American coast south of lat. 45°N. By October, the mean net flux is generally negative north of lat. 25°N, except in coastal areas out to about long. 125°W. From October through January, negative heat flux is most intense in the Gulf of Alaska and west of long. 150°W, between lat. 25° and 45°N. Heat loss is minimal between lat. 45° and 50°N west of long. 165°W, and our charts show an area of positive heat flux off southern California and Baja California in every month except December. Wyrtki's charts include all of these features and, in addition, show small areas of positive heat flux even in December. In February, positive values of heat flux appear in coastal areas south of lat. 40°N, out to long. 125°W. The largest negative flux of heat at this time occurs south of lat. 30°N, from long. 165° to 170°W according to Wyrtki's charts and somewhat north and west of that area on our charts.

March is a transition month with marked intensification of positive heat flux south of lat. 40°N from the coast out to long. 125°W, while the flux elsewhere is both positive and negative and generally weak. The principal features in the heat exchange pattern which characterize spring and summer are the areas of maximum positive heat flux along central and northern California and to the west of long. 150°W at lat. 30° to 35°N. Wyrtki also found a relative maximum along the southern stretch of Baja California which does not appear on our charts because of the cutoff east of long. 115°W. A relative minimum in the pattern occurs in the vicinity of long. 130°W at about lat. 20° to 25°N. Our charts show a negative flux in this area in every month except August and September. Wyrtki found negative values in the same area in every month except July and September.

The values of net heat flux computed by Wyrtki differ from those presented in this report by 50 cal/cm²/day or more in many areas. Such differences may reflect dissimilarities in data distribution, methods of processing or real climatological trends. The main features in the mean seasonal patterns of net heat exchange depicted by our charts appear, however, to be well substantiated by comparison with those of Wyrtki.

ACKNOWLEDGMENTS

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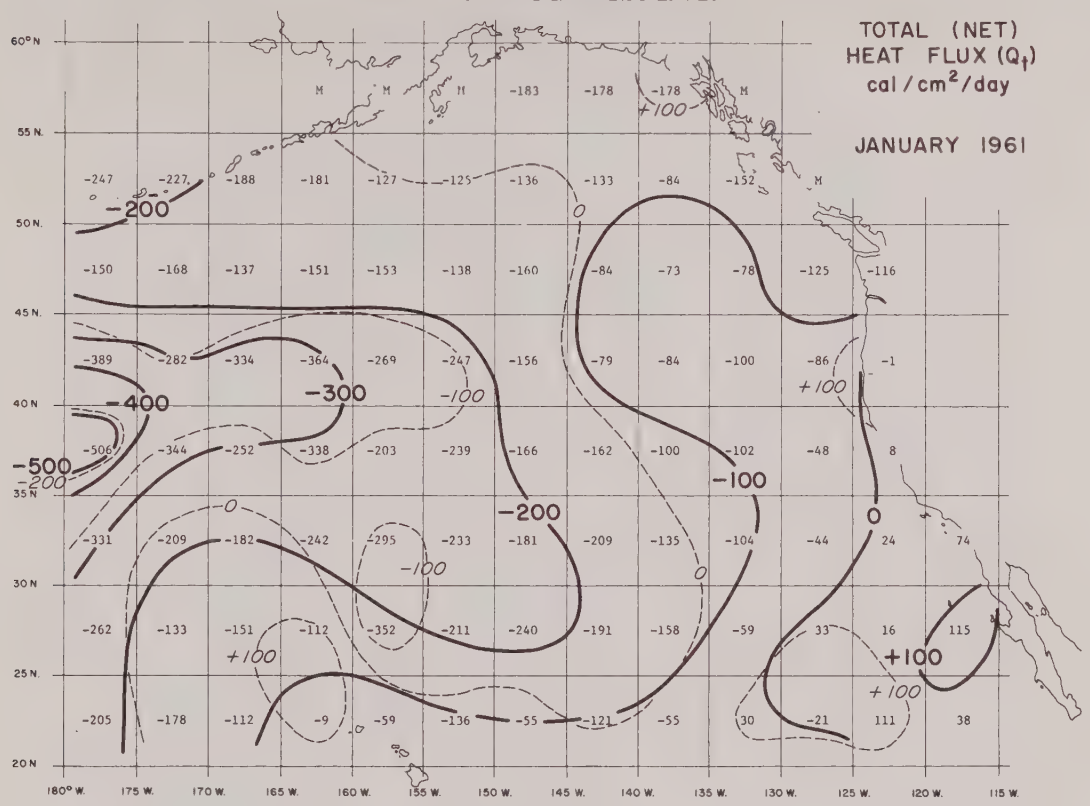
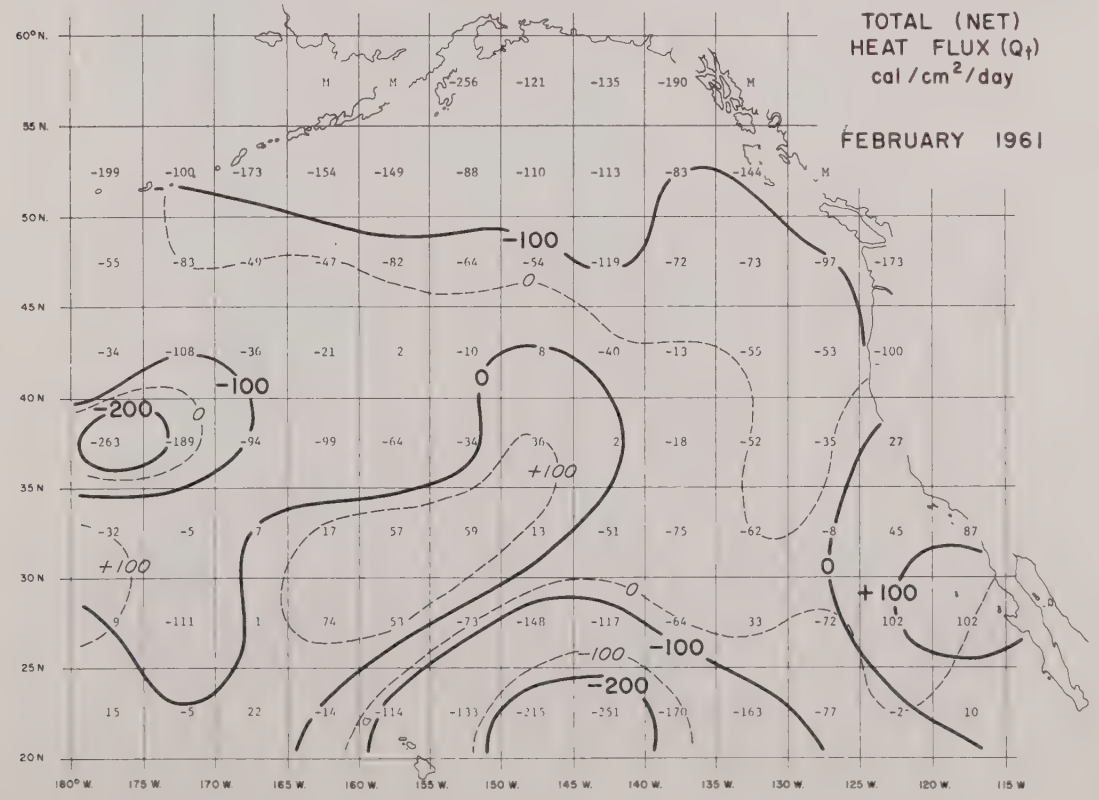
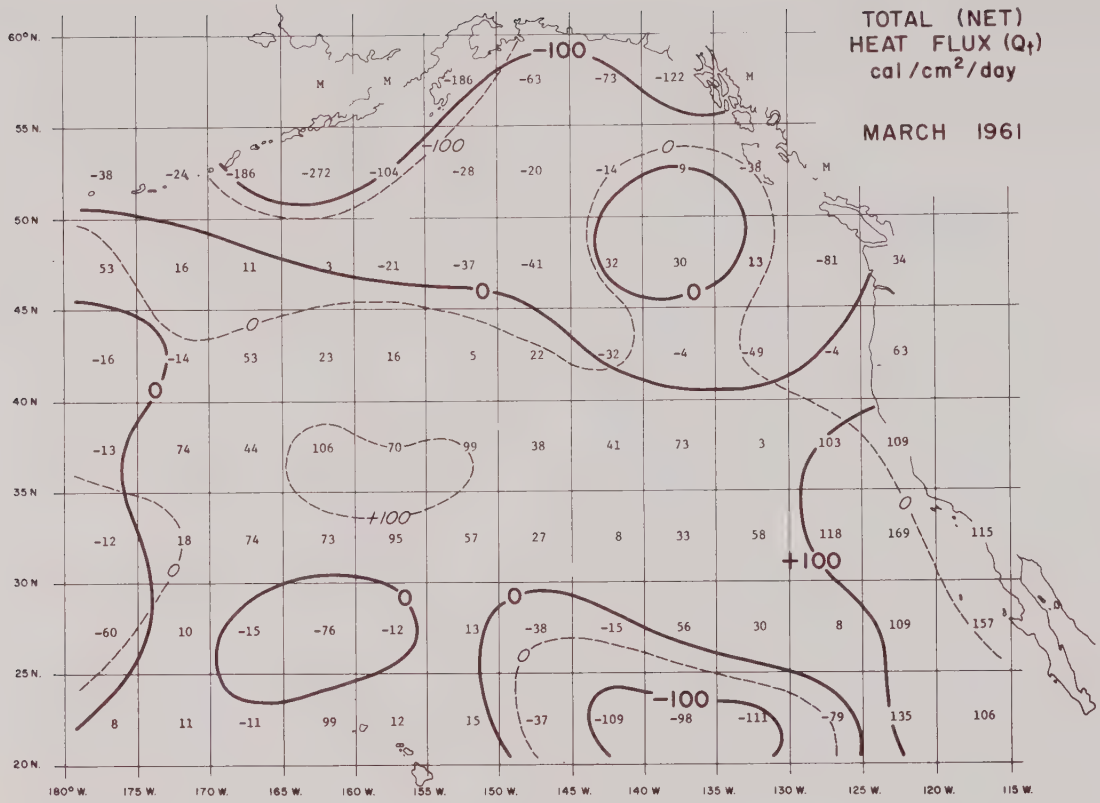
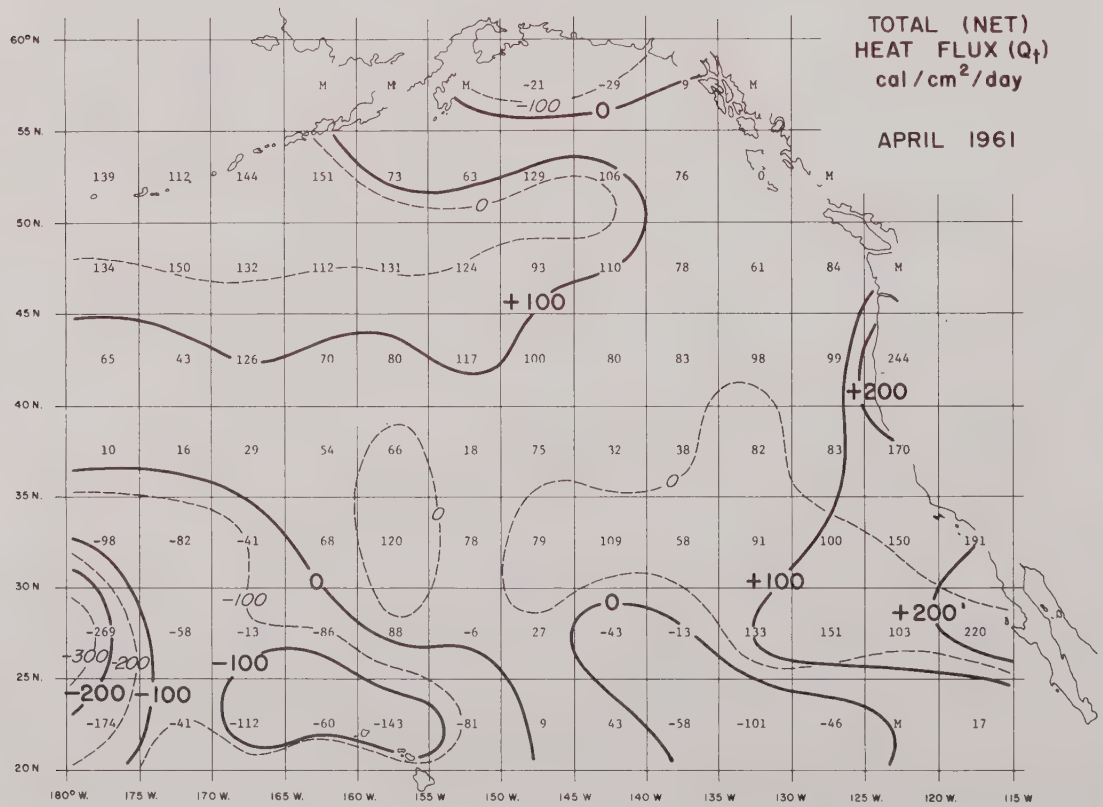
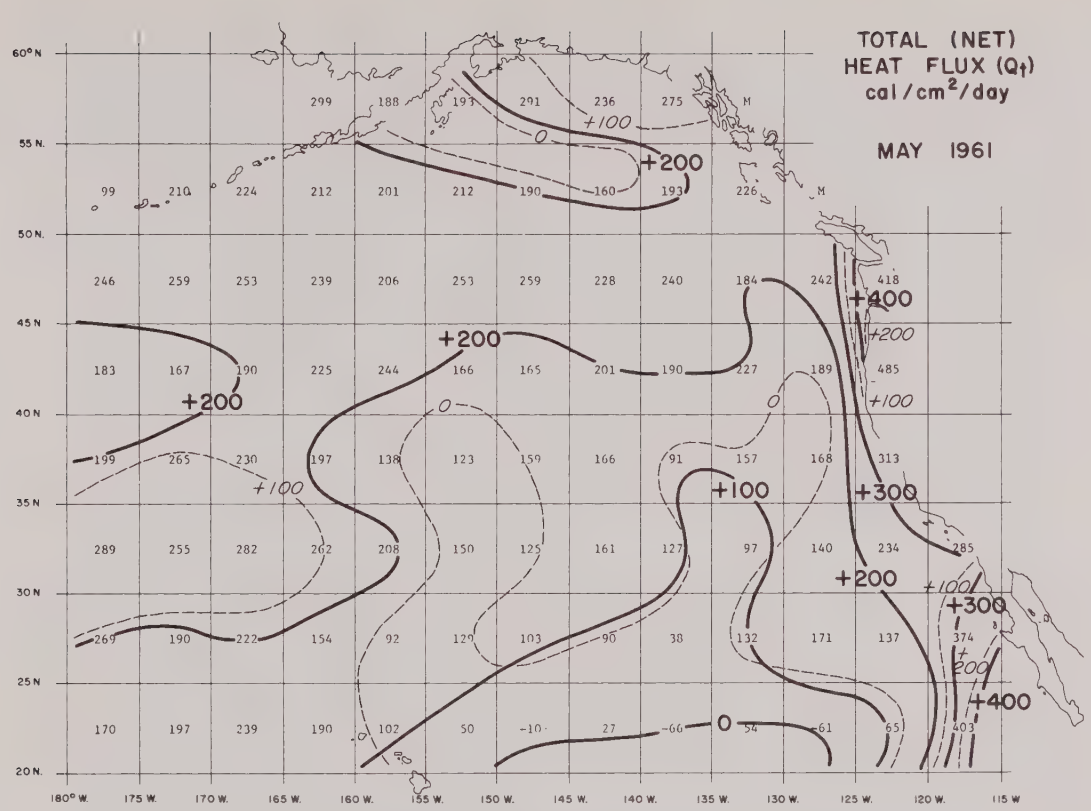
PART 1. TOTAL (NET) HEAT FLUX MONTHLY AVERAGES AND ANOMALIES, JANUARY 1961 TO DECEMBER 1971.

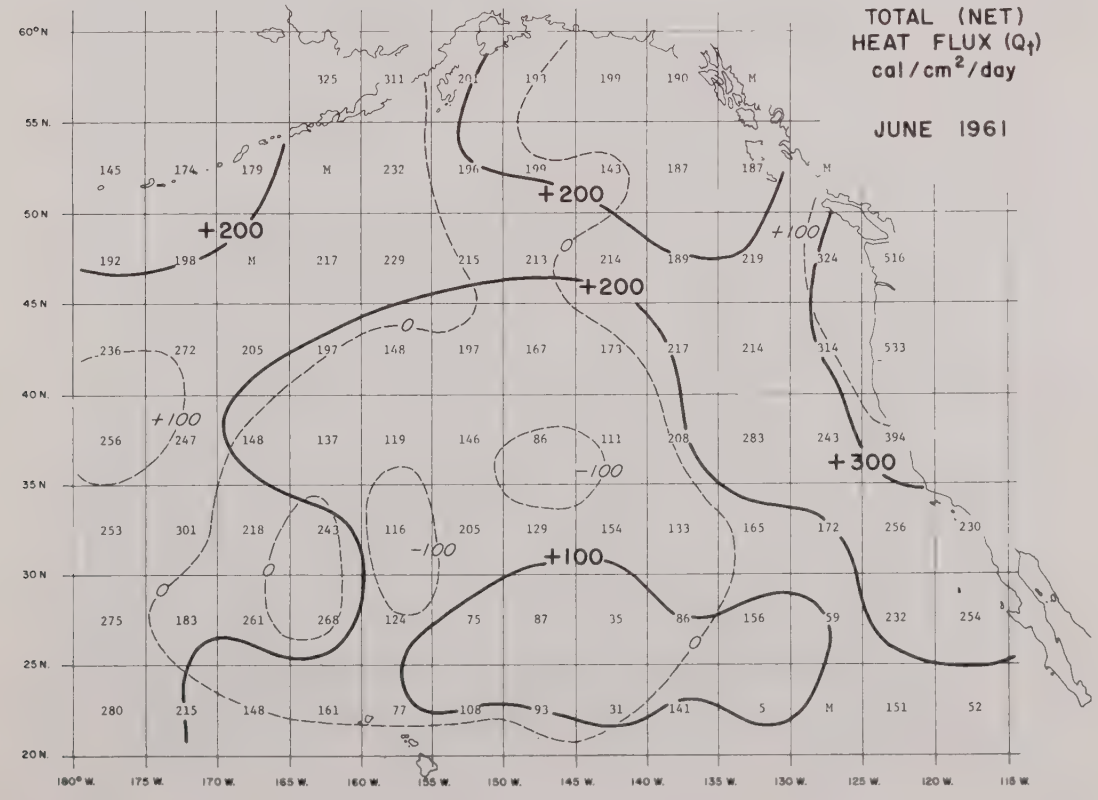





TOTAL (NET)
HEAT FLUX (Q_t)
cal/cm²/day
MARCH 1961
60° N.
55 N.
50 N
45 N
40 N
35 N
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.


TOTAL (NET)
HEAT FLUX (Q_t)
cal/cm²/day
APRIL 1961
60° N
55 N.
50 N.
45 N
40 N.
35 N.
30 N
25 N.
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W
150 W.
145 W
140 W
135 W
130 W
125 W.
120 W.
115 W


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
MAY 1961
60° N
55 N.
50 N.
45 N
40 N
35 N
30 N
25 N
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W
+400
+300
+200
+100
0
-100


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JUNE 1961
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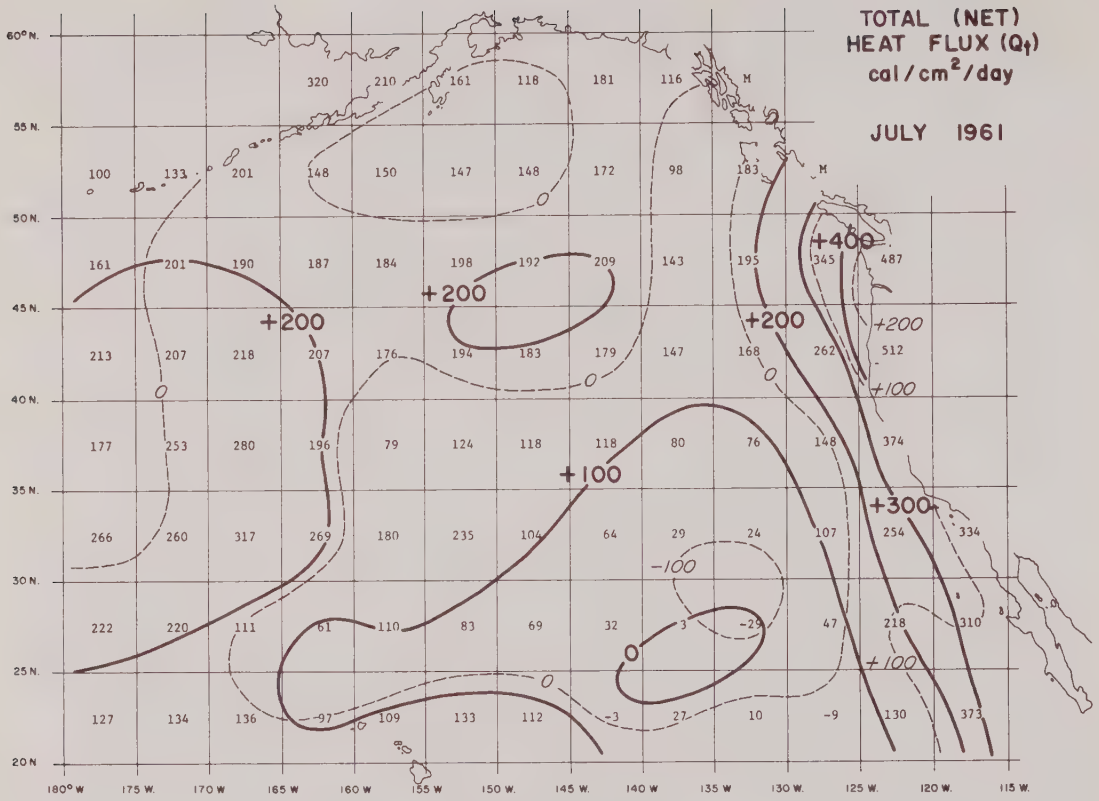
55 N.
50 N
45 N
40 N.
35 N
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+300
+200
+100
0
-100


TOTAL (NET)
HEAT FLUX (Q_t)
cal/cm²/day
JULY 1961
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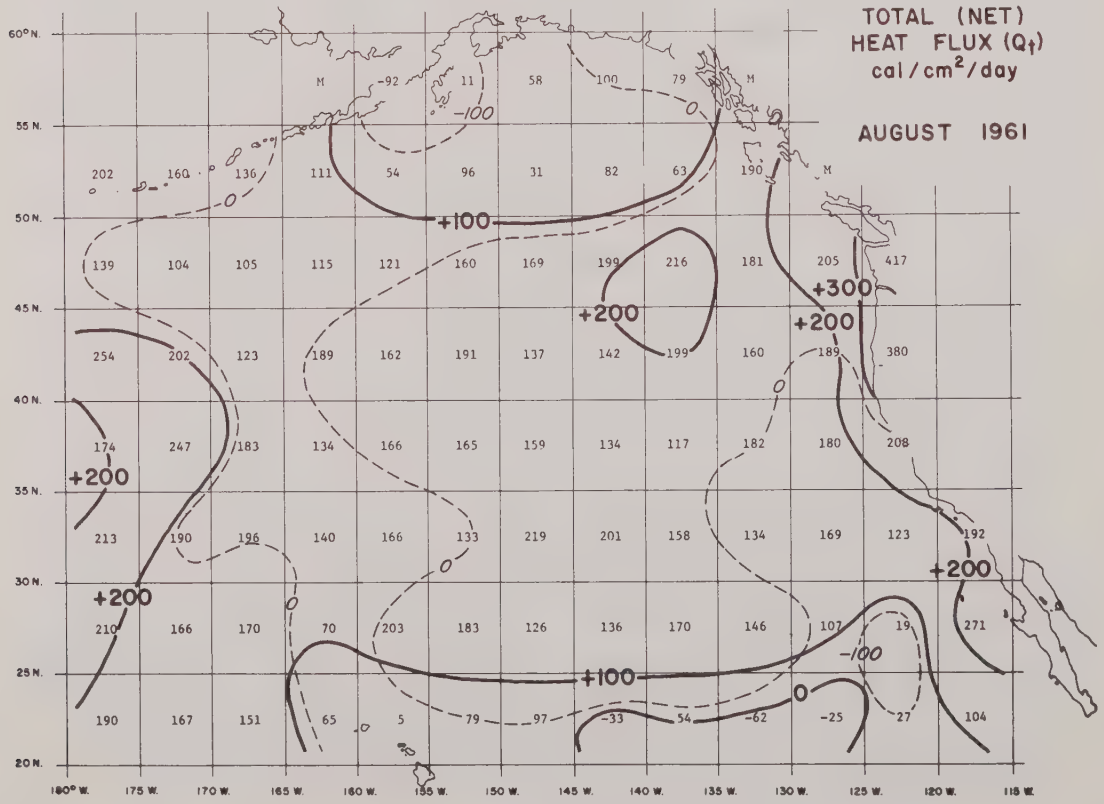
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N
180° W
175 W.
170 W
165 W
160 W
155 W
150 W.
145 W.
140 W
135 W
130 W.
125 W.
120 W.
115 W.
+400
+200
+100
+300
-100
0


TOTAL (NET)
HEAT FLUX (Q_t)
cal/cm²/day
AUGUST 1961
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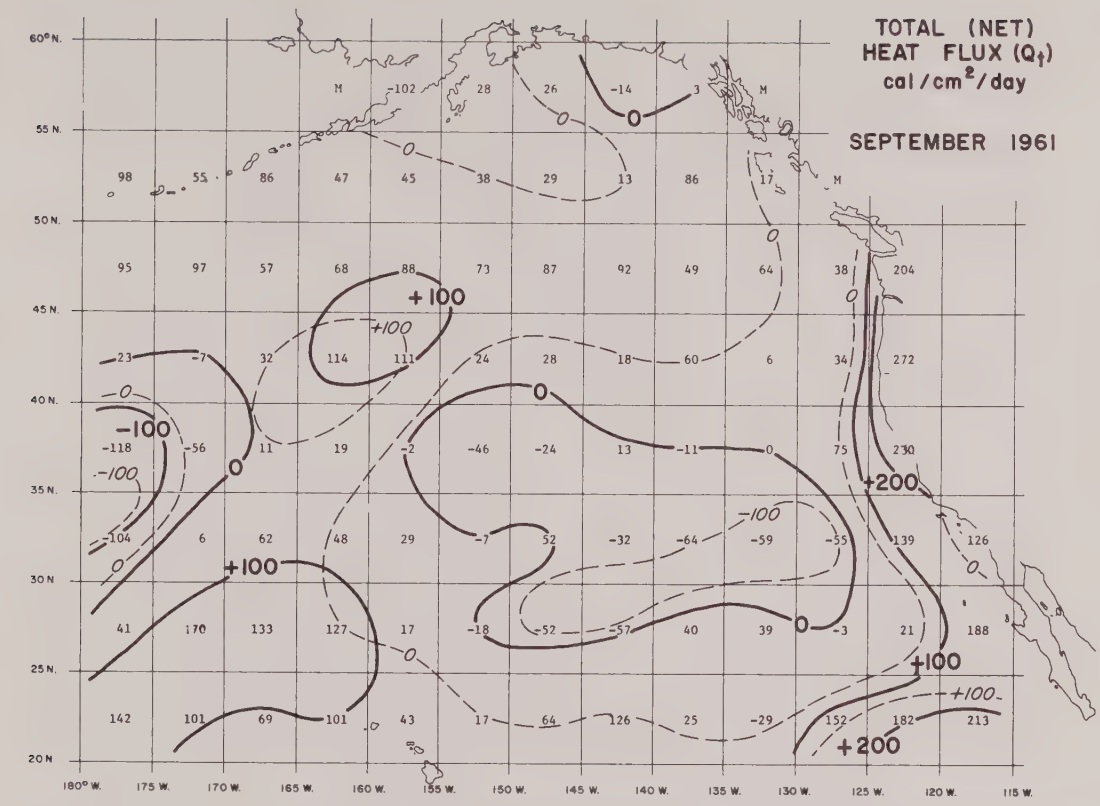
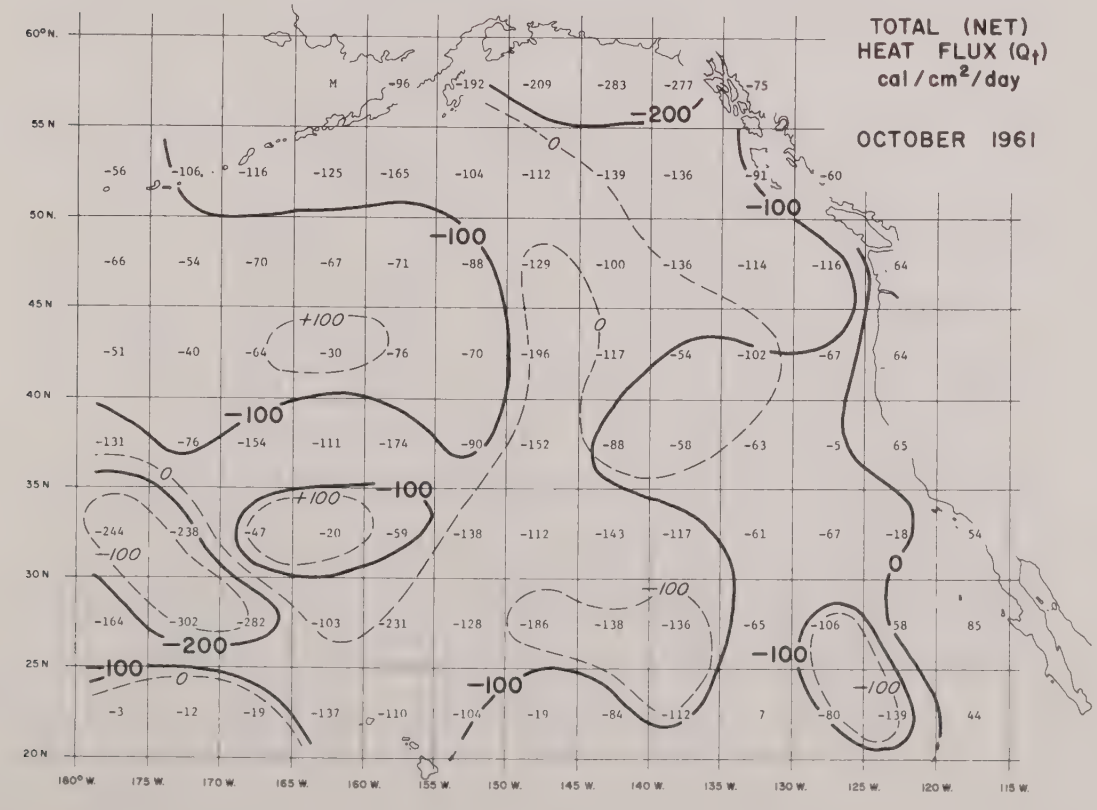
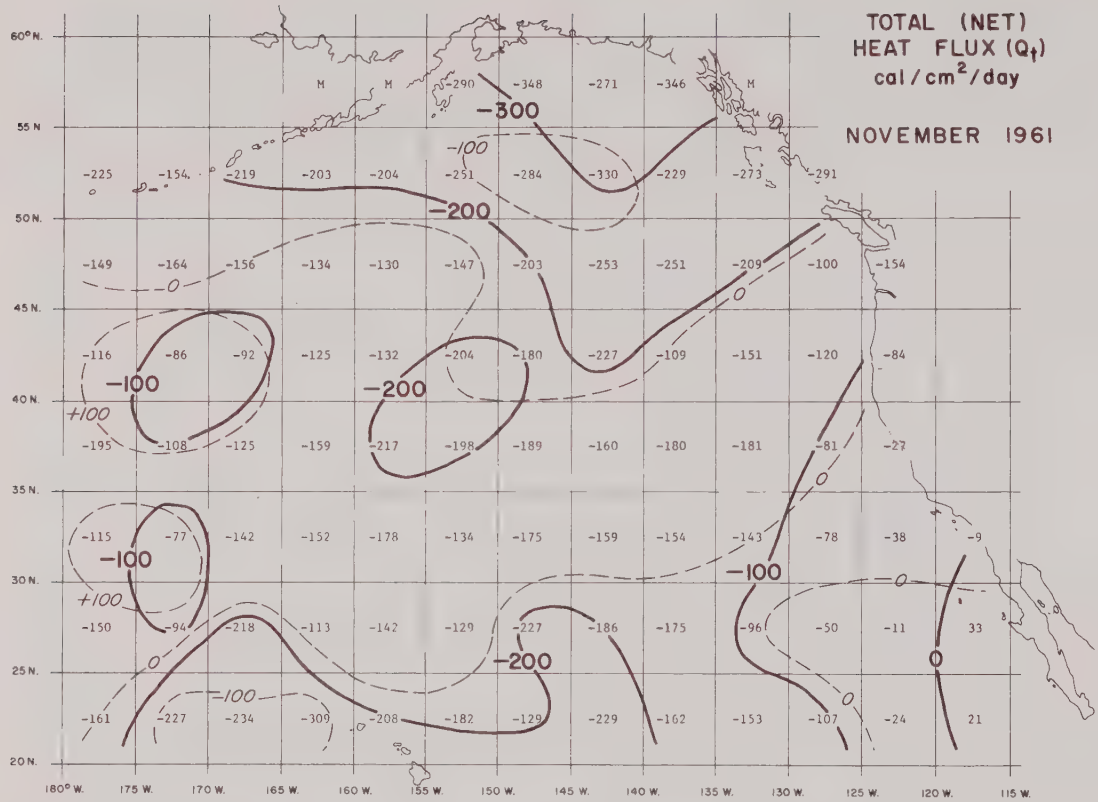
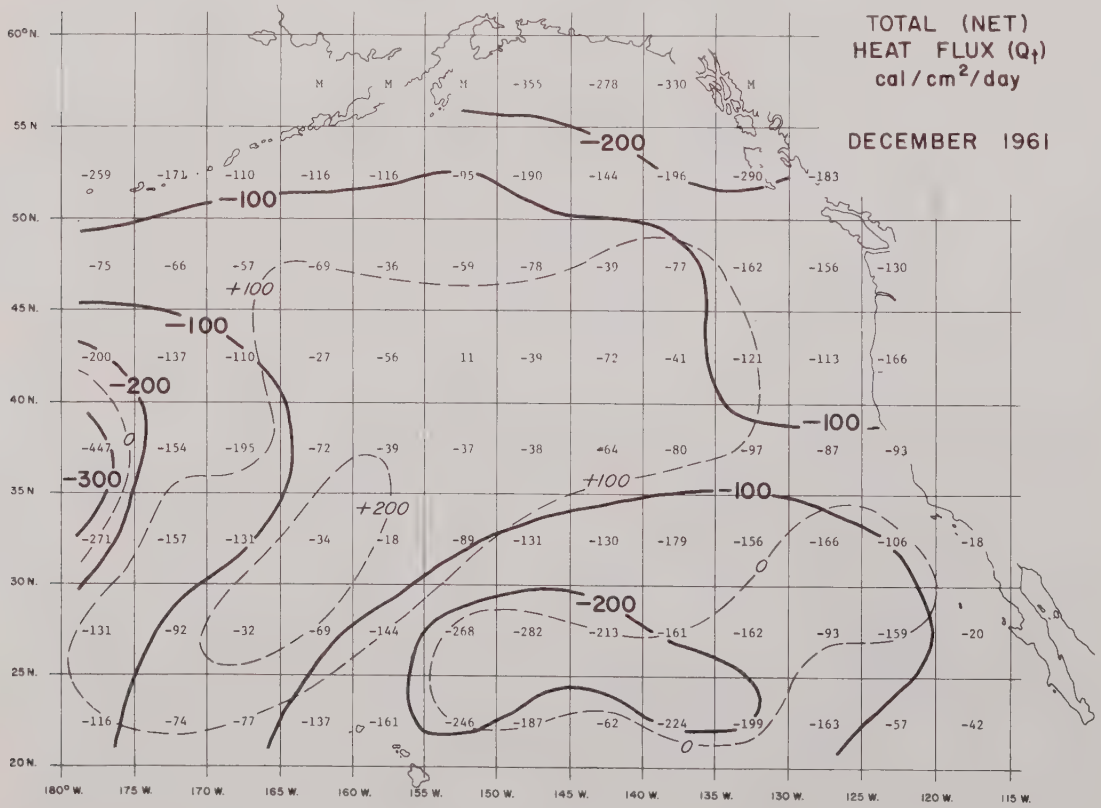
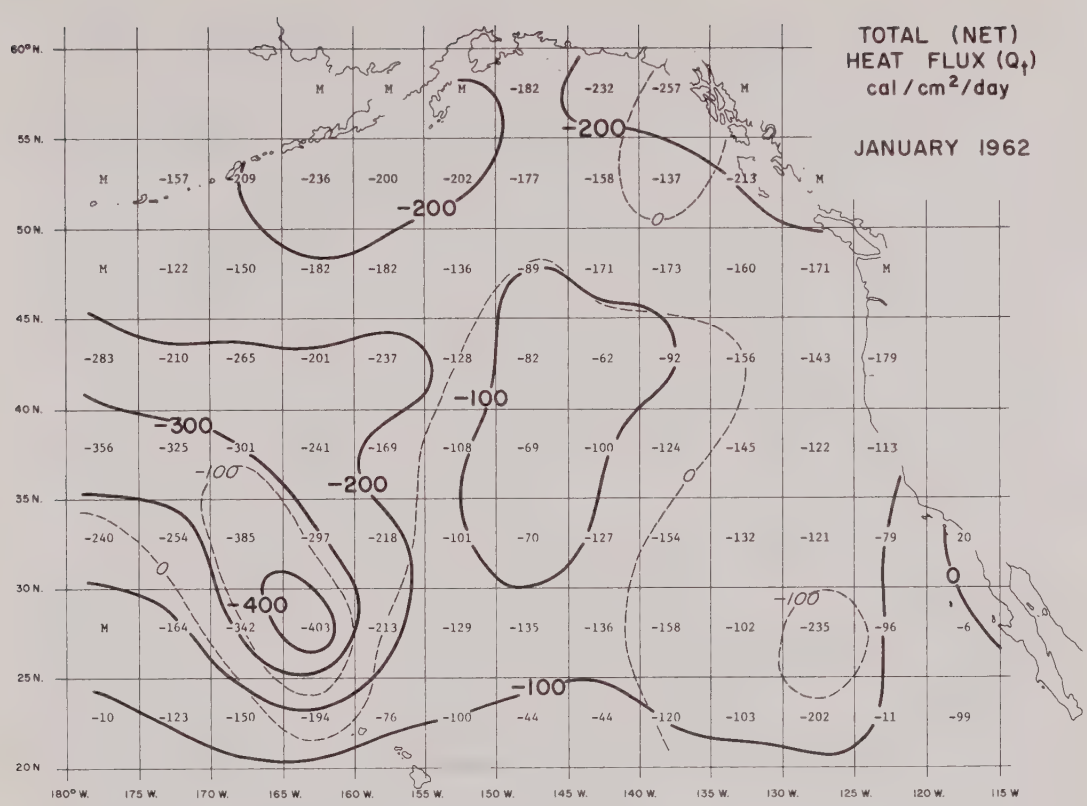
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+300
+200
+100
-100
0

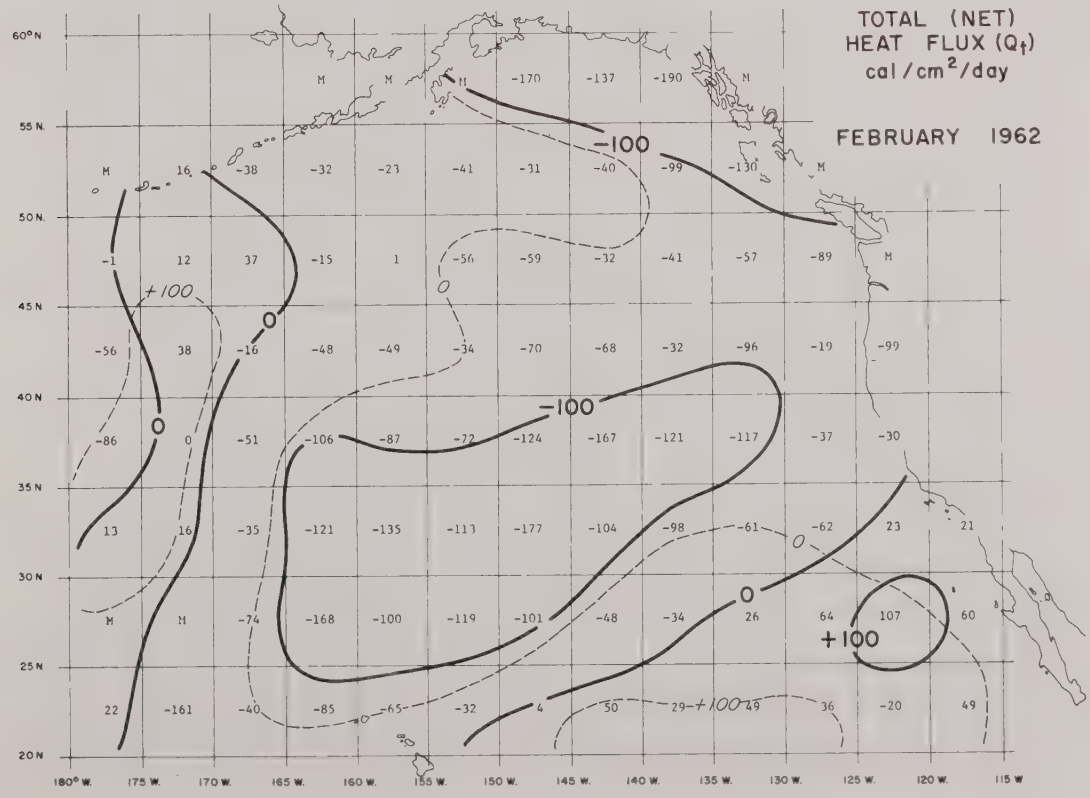

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm² / day
SEPTEMBER 1961
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N.
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

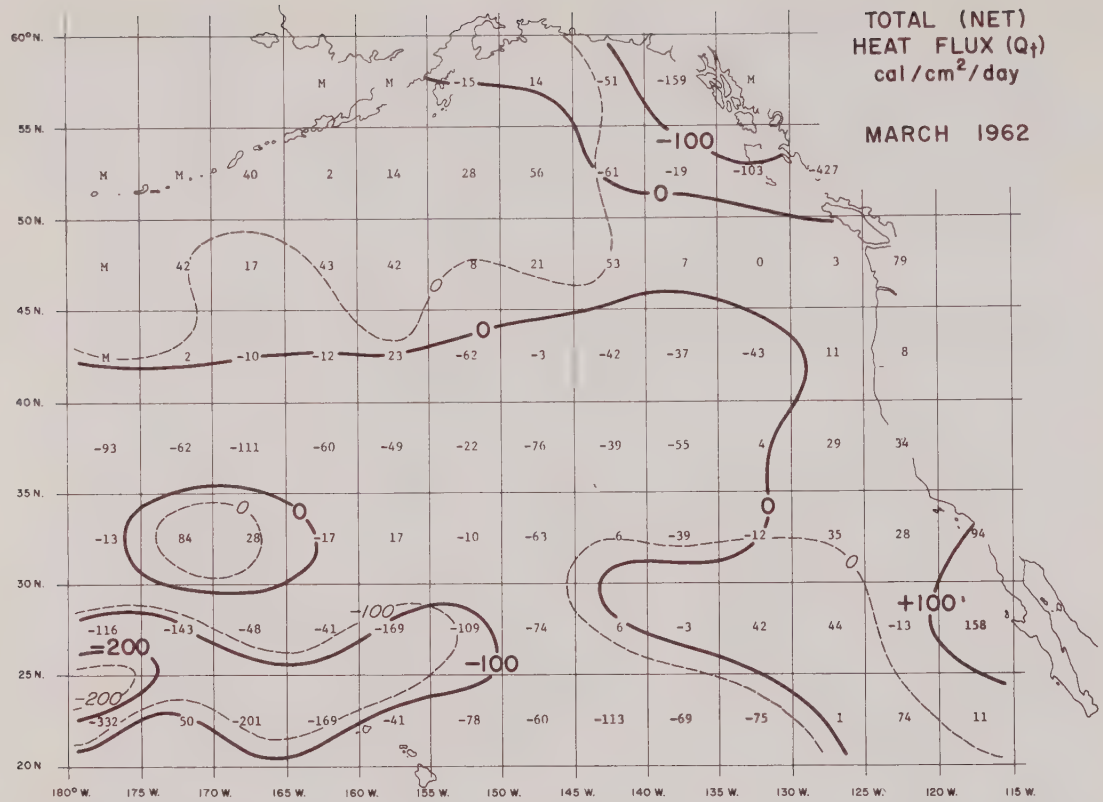

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm² / day
OCTOBER 1961
60° N.
55 N
50 N.
45 N
40 N
35 N
30 N
25 N
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

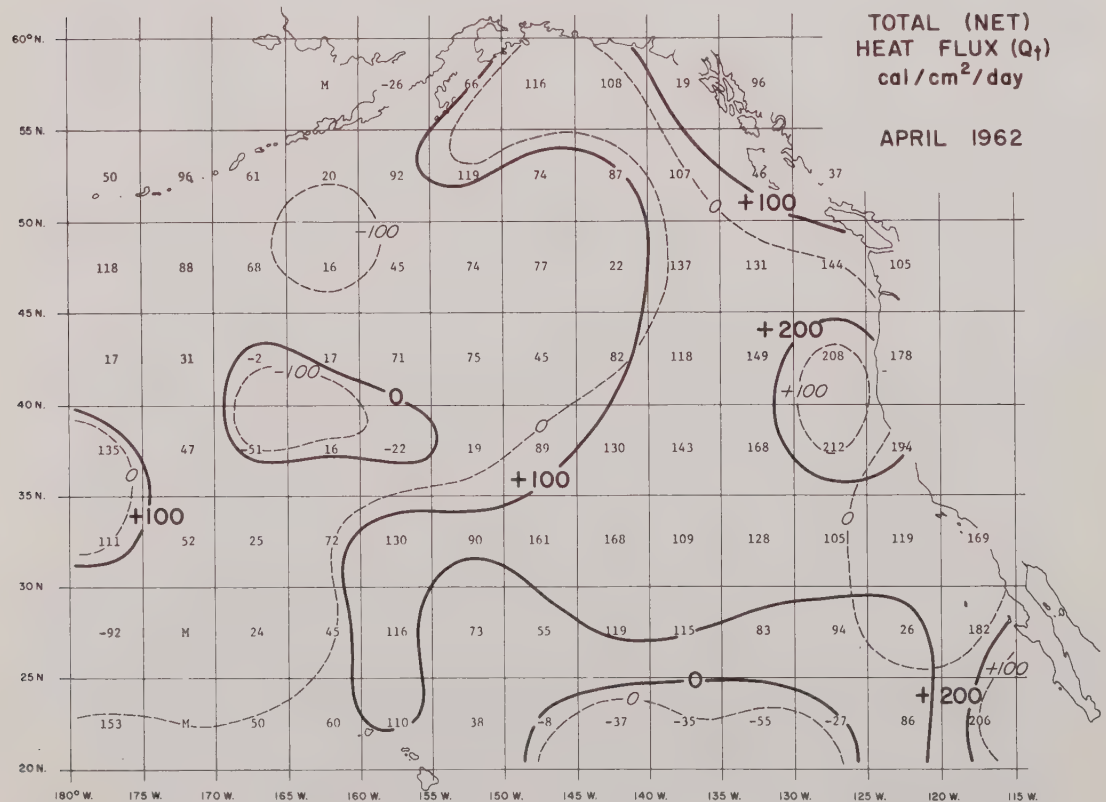

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
NOVEMBER 1961
60° N.
55 N
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-300
-200
-100
0
+100

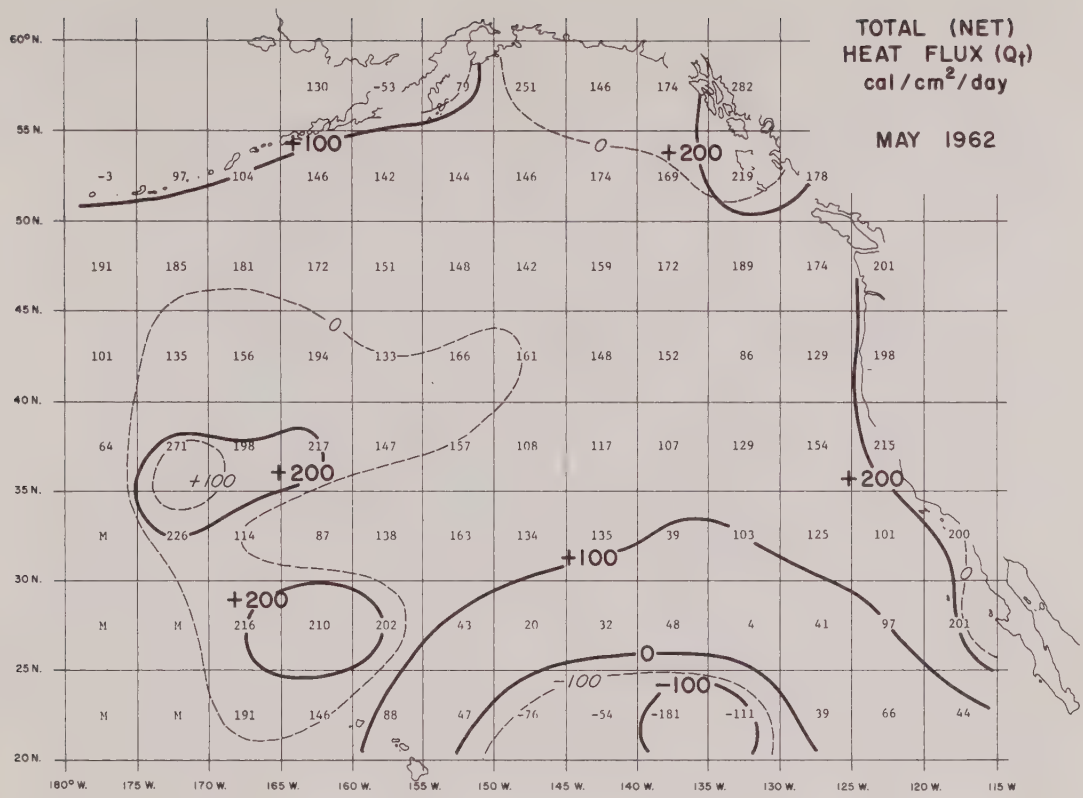

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
DECEMBER 1961
60° N.
55 N
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-300
-200
-100
0
+100
+200

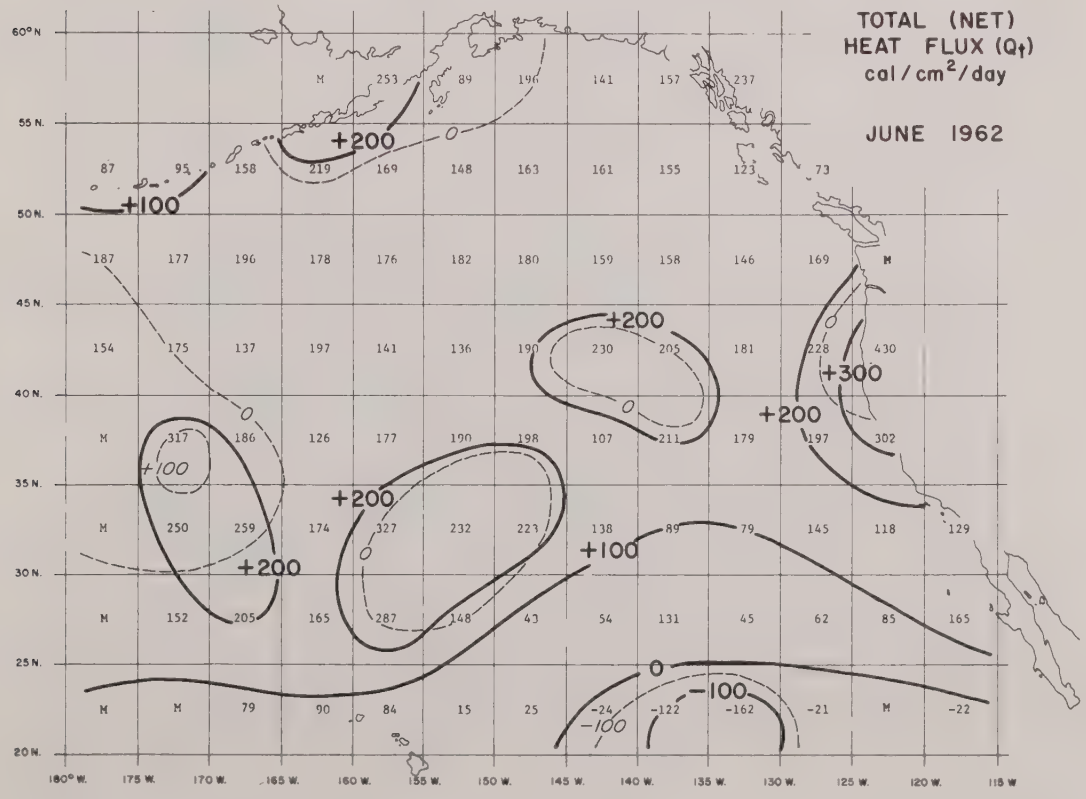

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2/day
JANUARY 1962
60°N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W
-200
-300
-100
-400
0
+100

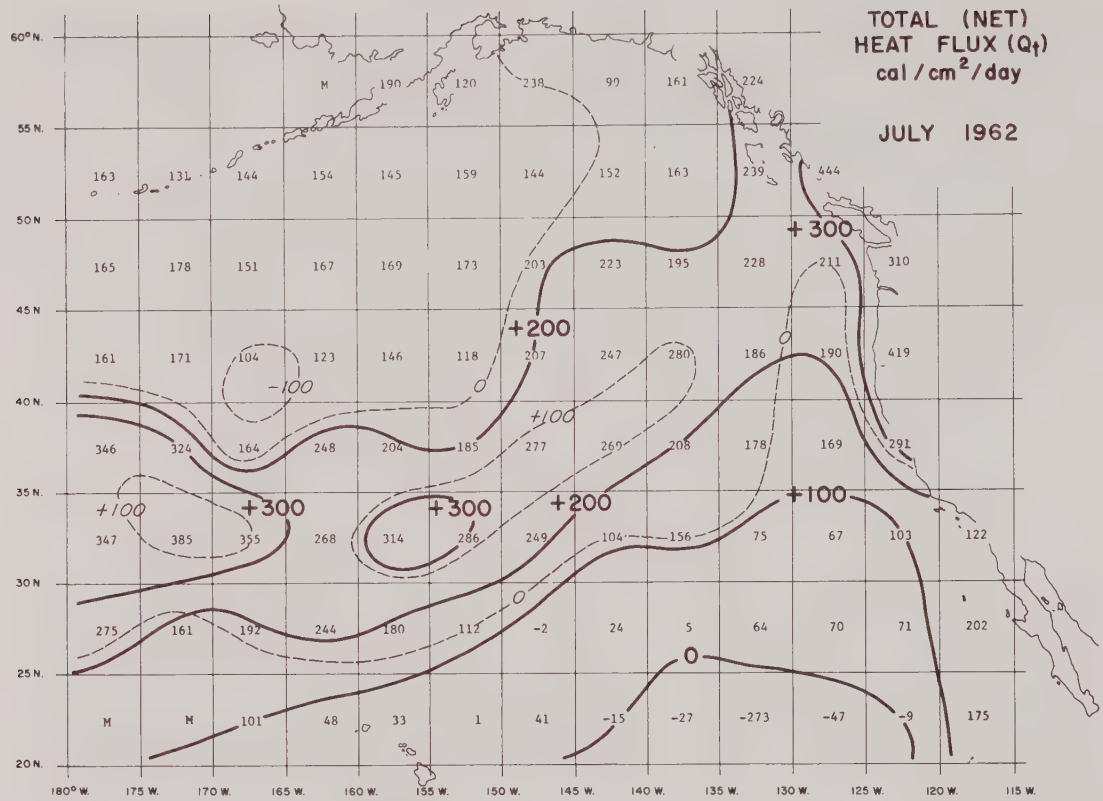

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2/day
FEBRUARY 1962
60°N
55 N.
50 N.
45 N
40 N
35 N
30 N
25 N
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W
-100
0
+100

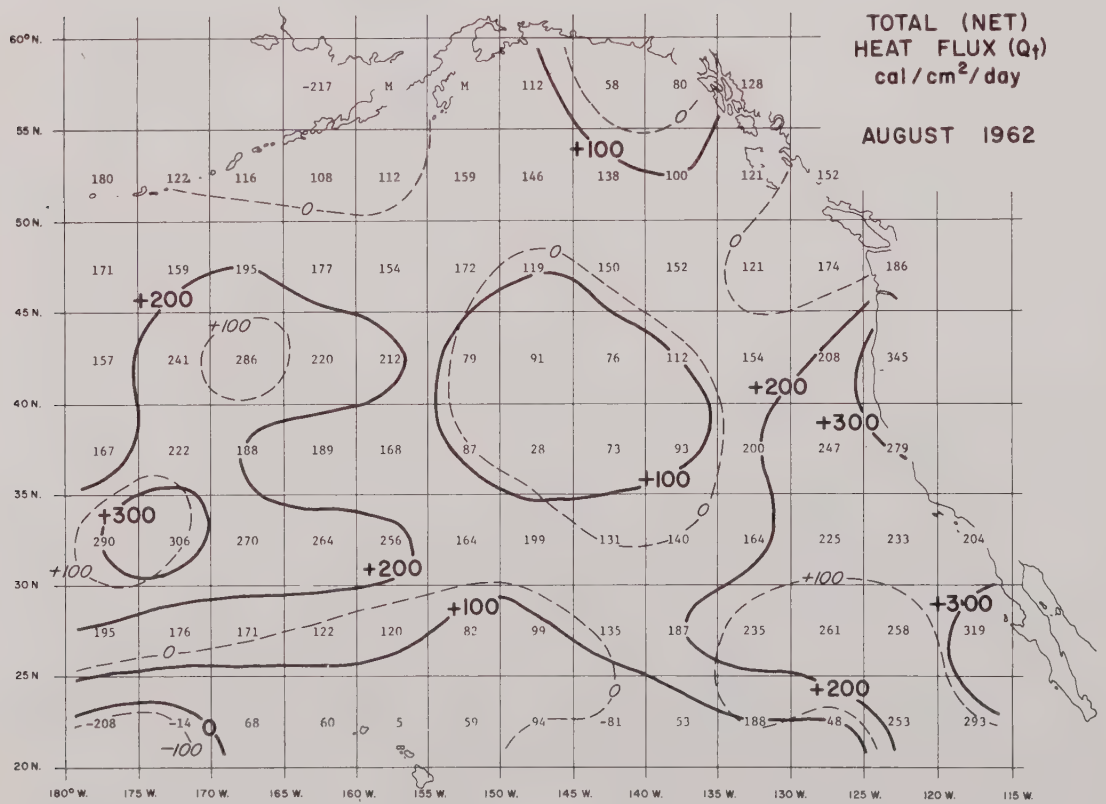

TOTAL (NET)
HEAT FLUX (Qt)
cal/cm²/day
MARCH 1962
60°N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-100
0
+100
-200
+200

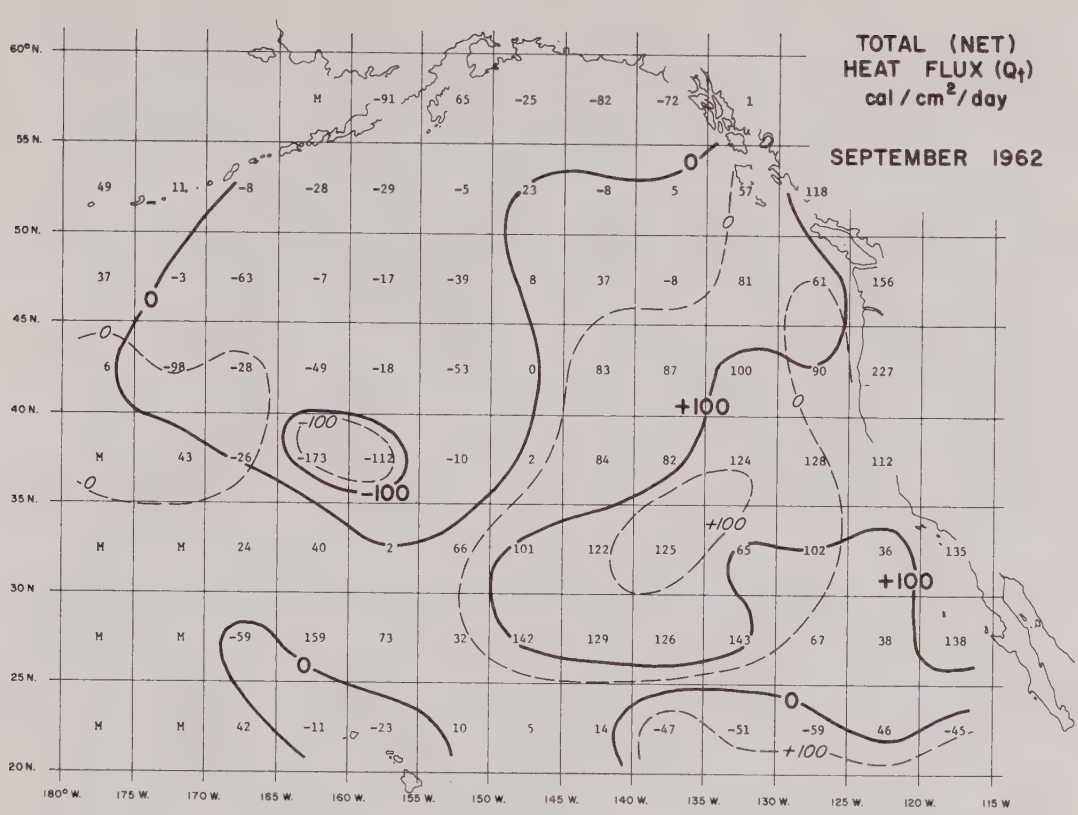

TOTAL (NET)
HEAT FLUX (Qt)
cal/cm²/day
APRIL 1962
60°N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-100
0
+100
+200

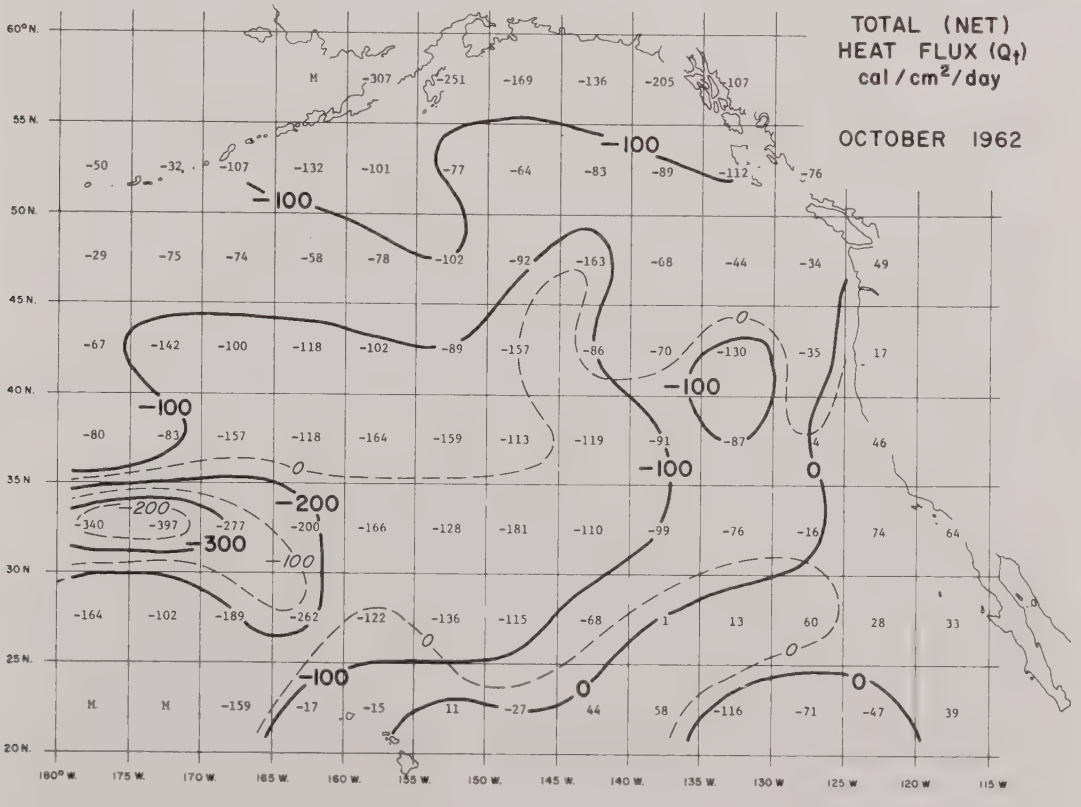

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
MAY 1962
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W
+100
+200
0
-100

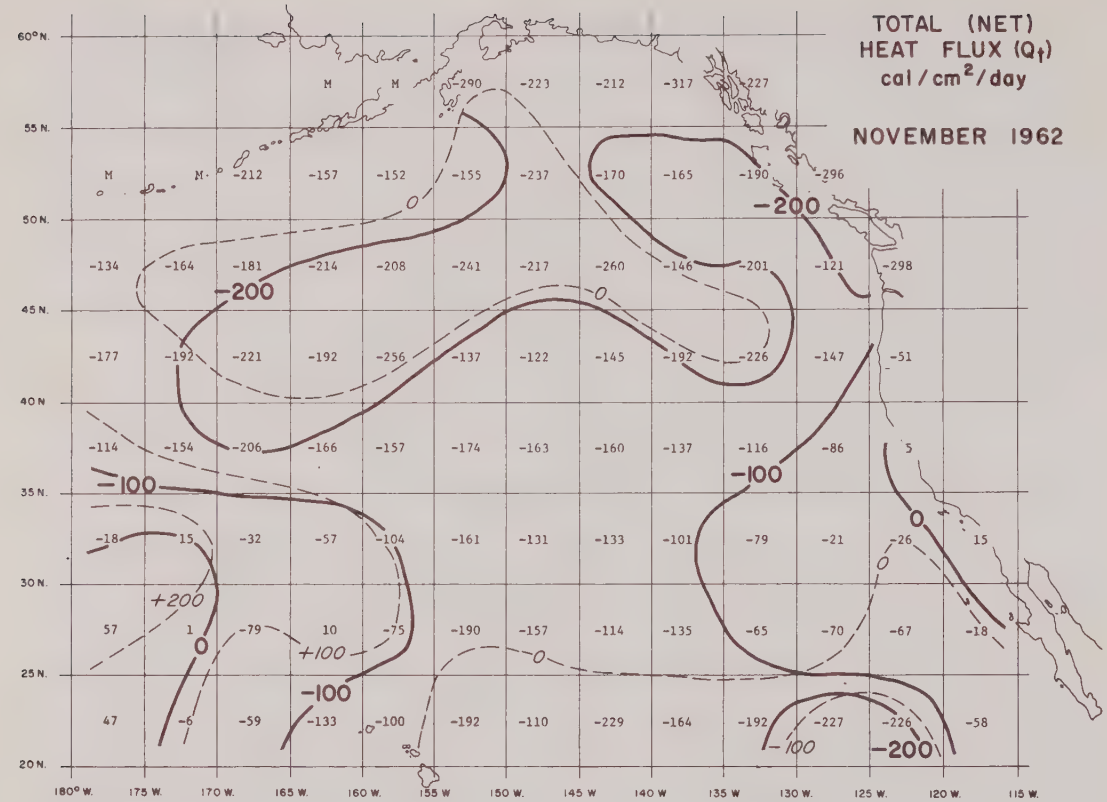

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JUNE 1962
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W
+100
+200
+300
0
-100


TOTAL (NET)
HEAT FLUX (Qt)
cal / cm² / day
JULY 1962
60° N.
55 N.
50 N
45 N
40 N.
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+300
+200
+100
0
-100


TOTAL (NET)
HEAT FLUX (Qt)
cal / cm² / day
AUGUST 1962
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+300
+200
+100
0
-100


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
SEPTEMBER 1962
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W
+100
-100
0


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
OCTOBER 1962
60° N.
55 N.
50 N.
45 N.
40 N.
35 N
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W
125 W
120 W
115 W
-100
-200
-300
0


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
NOVEMBER 1962
60°N.
55 N.
50 N.
45 N.
40 N
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W
150 W.
145 W
140 W
135 W.
130 W.
125 W.
120 W.
115 W.
M M -290 -223 -212 -317 -227
M M -212 -157 -152 -155 -237 -170 -165 -190 -296
-134 -164 -181 -214 -208 -241 -217 -260 -146 -201 -121 -298
-177 -192 -221 -192 -256 -137 -122 -145 -192 -226 -147 -51
-114 -154 -206 -166 -157 -174 -163 -160 -137 -116 -86 5
-18 15 -32 -57 -104 -161 -131 -133 -101 -79 -21 -26 15
57 1 -79 10 -75 -190 -157 -114 -135 -65 -70 -67 -18
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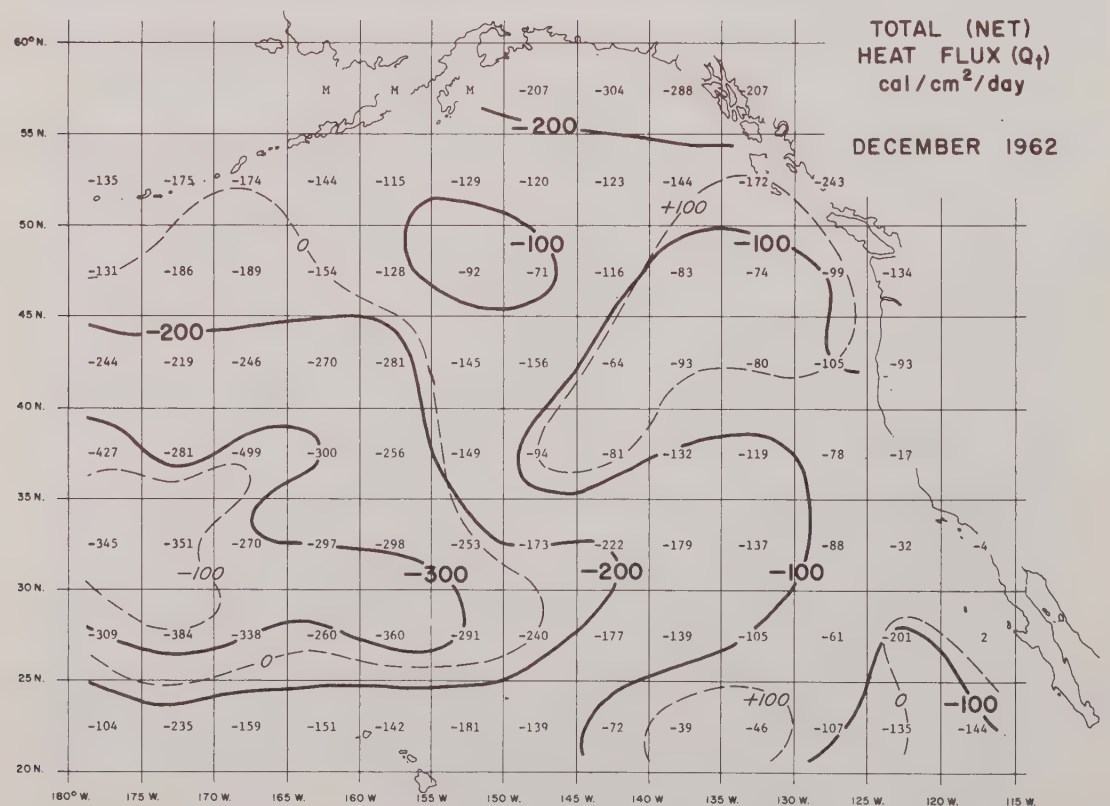
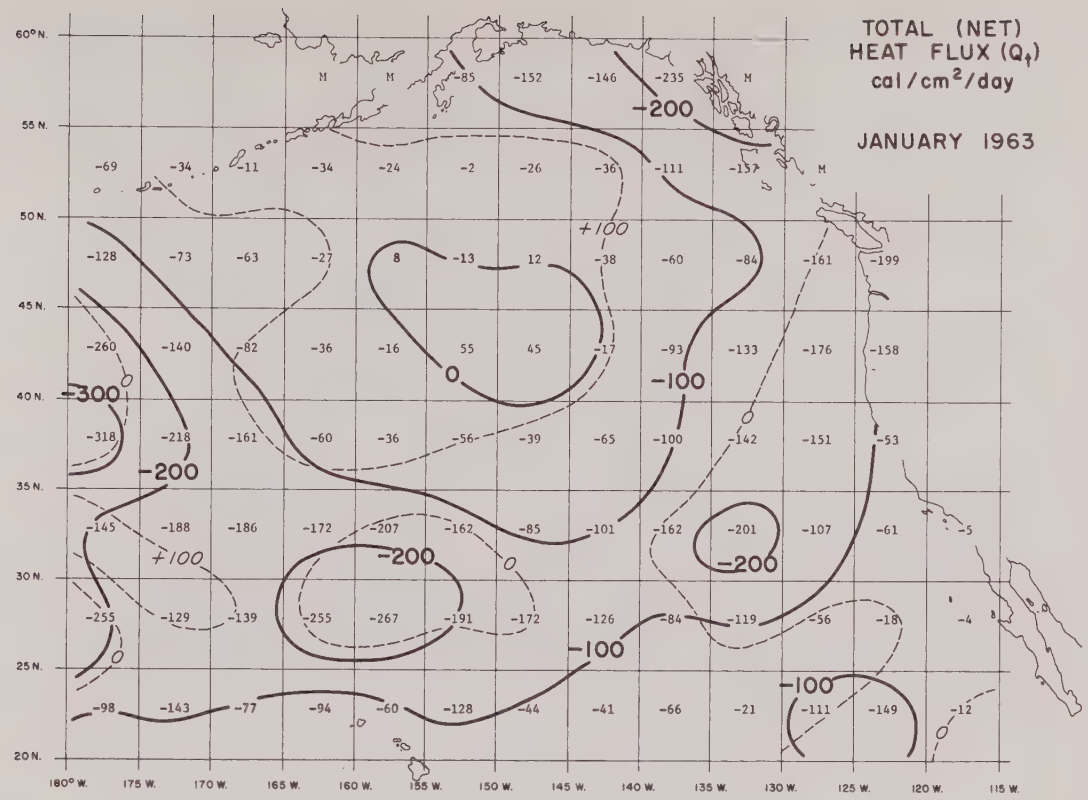
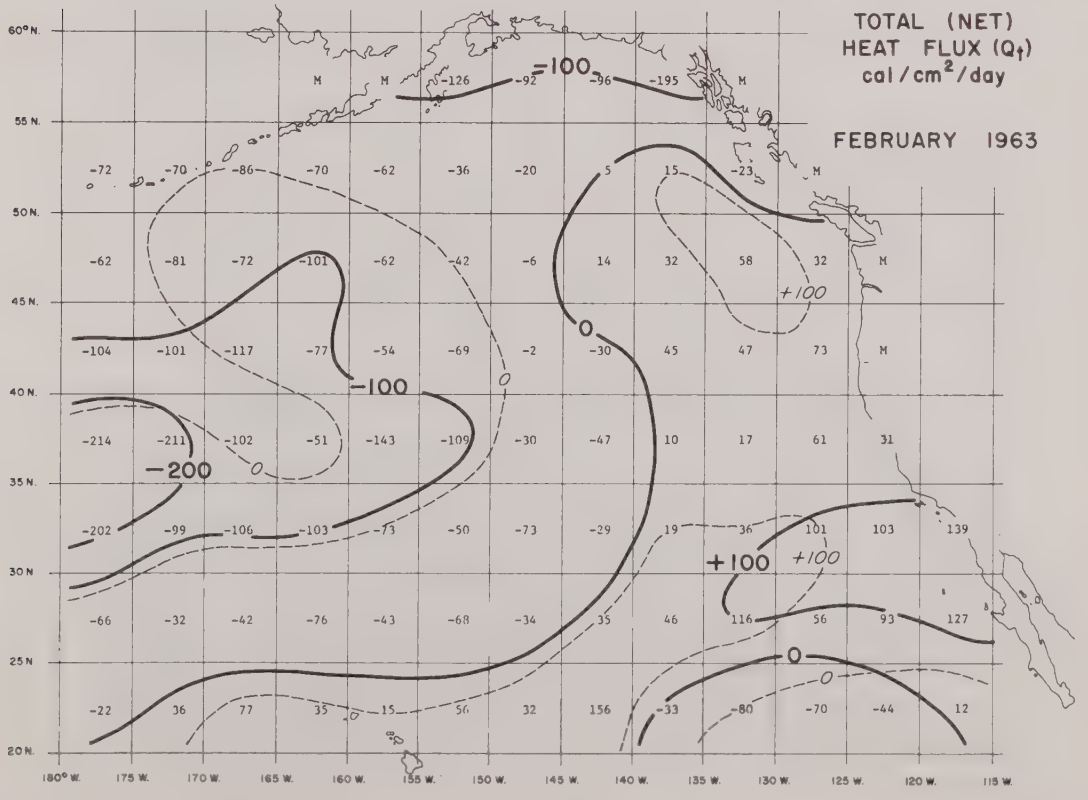
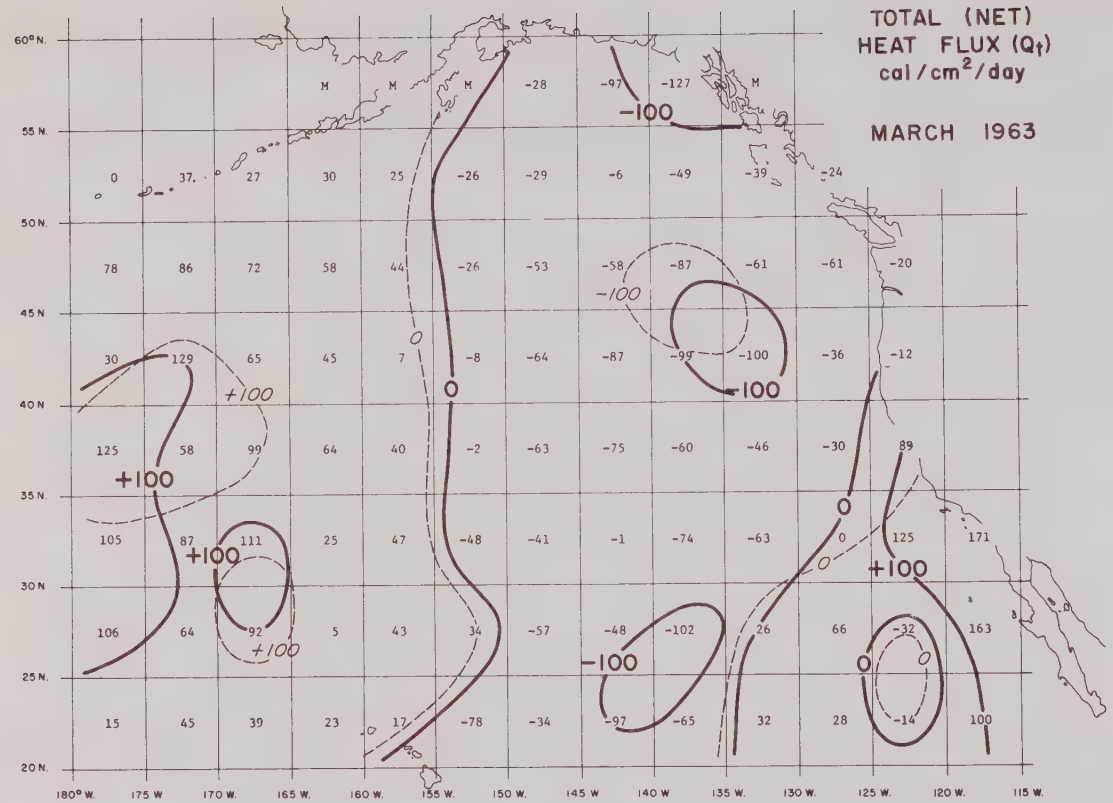
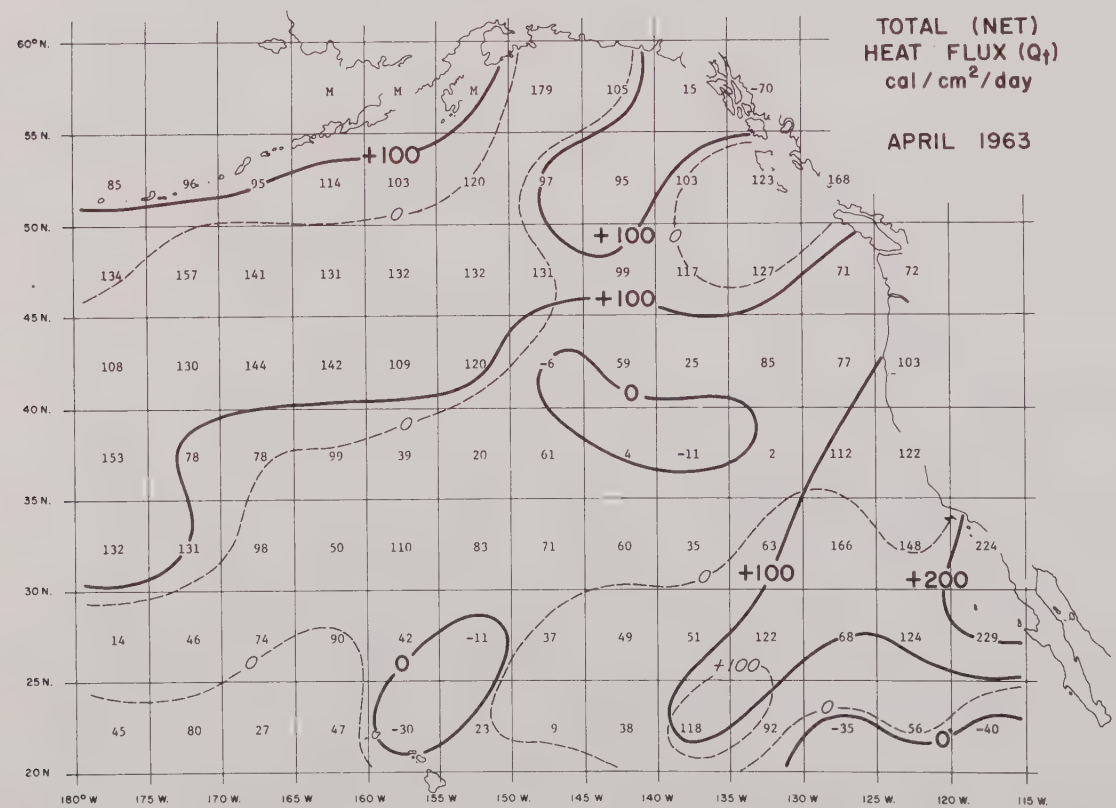
-100
0
+200
+100
-100
-200
-100
-200

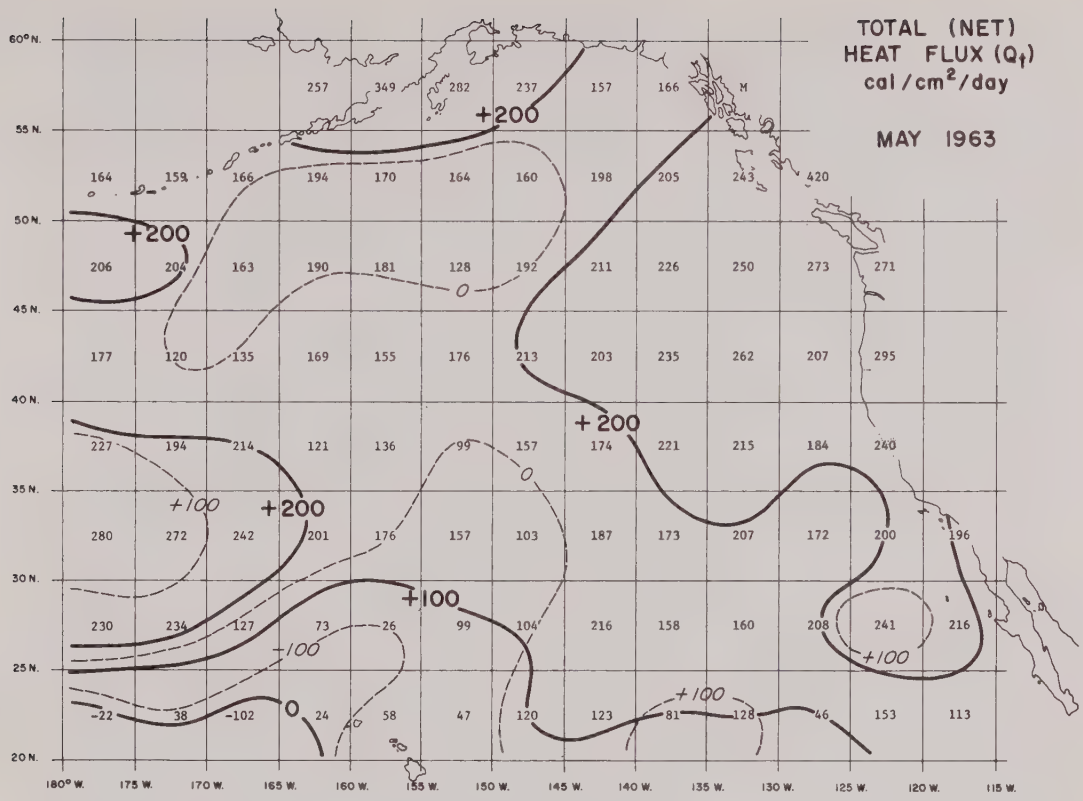

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
DECEMBER 1962
60°N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W
155 W
150 W.
145 W.
140 W
135 W.
130 W.
125 W.
120 W.
115 W.
M M M -207 -304 -288 -207
-135 -175 -174 -144 -115 -129 -120 -123 -144 -172 -243
-131 -186 -189 -154 -128 -92 -71 -116 -83 -74 -99 -134
-244 -219 -246 -270 -281 -145 -156 -64 -93 -80 -105 -93
-427 -281 -499 -300 -256 -149 -94 -81 -132 -119 -78 -17
-345 -351 -270 -297 -298 -253 -173 -222 -179 -137 -88 -32 -4
-309 -384 -338 -260 -360 -291 -240 -177 -139 -105 -61 -201 2
-104 -235 -159 -151 -142 -181 -139 -72 -39 -46 -107 -135 -144
-200
-100
-100
+100
-200
-100
-300
-200
-100
+100
-100

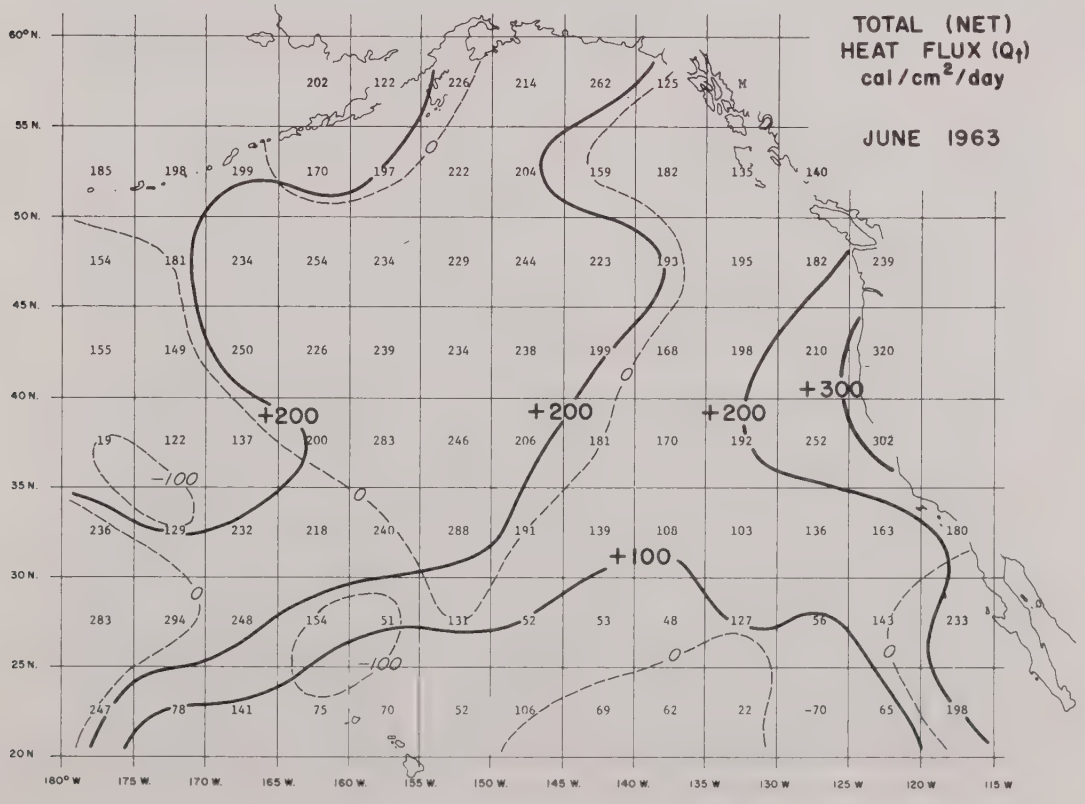

TOTAL (NET)
HEAT FLUX (Q_t)
cal/cm²/day
JANUARY 1963
60°N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-200
-300
-100
0
+100

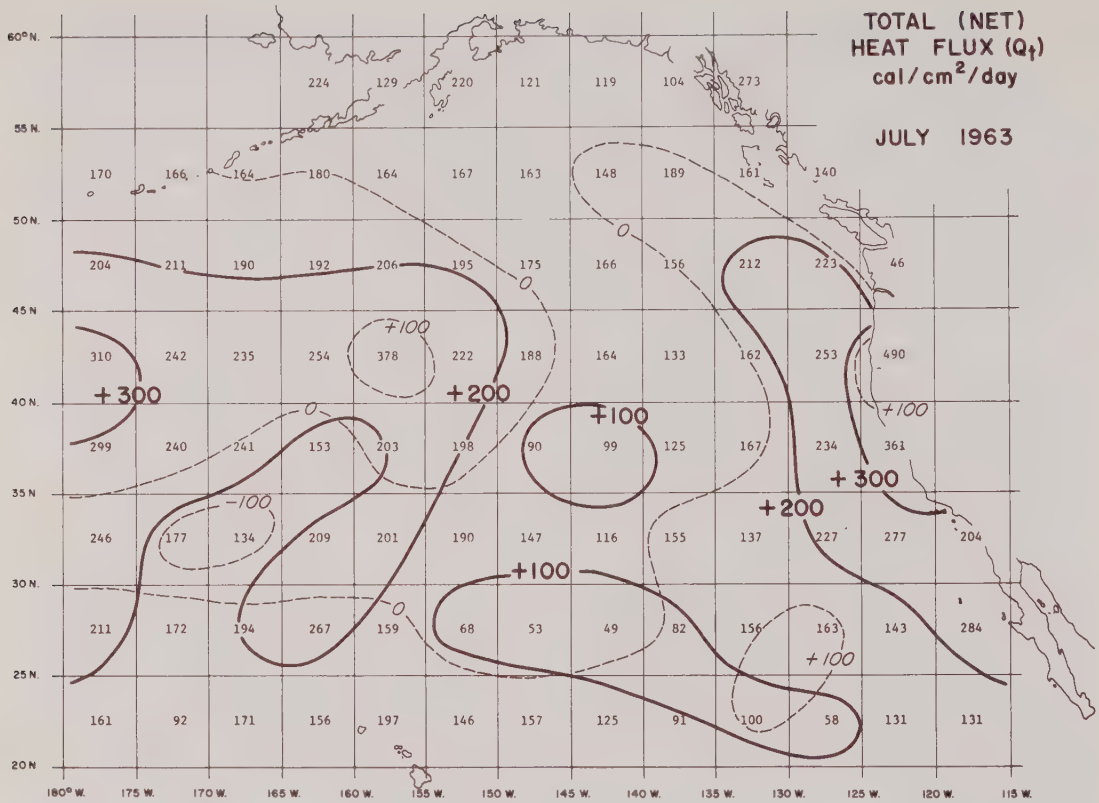

TOTAL (NET)
HEAT FLUX (Q_t)
cal/cm²/day
FEBRUARY 1963
60°N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-100
-200
0
+100

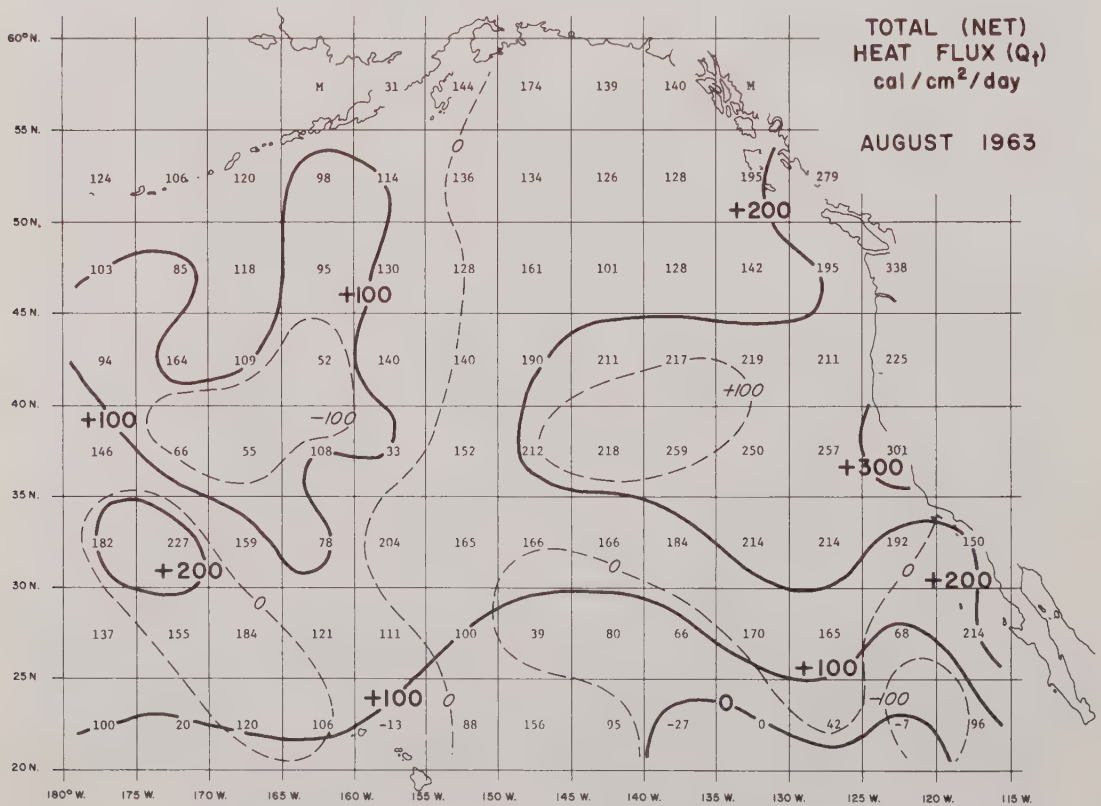

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
MARCH 1963
60°N.
55 N.
50 N.
45 N
40 N
35 N.
30 N
25 N.
20 N.
180° W.
175 W
170 W.
165 W.
160 W.
155 W.
150 W.
145 W
140 W
135 W.
130 W.
125 W.
120 W.
115 W.
+100
-100
0
+200

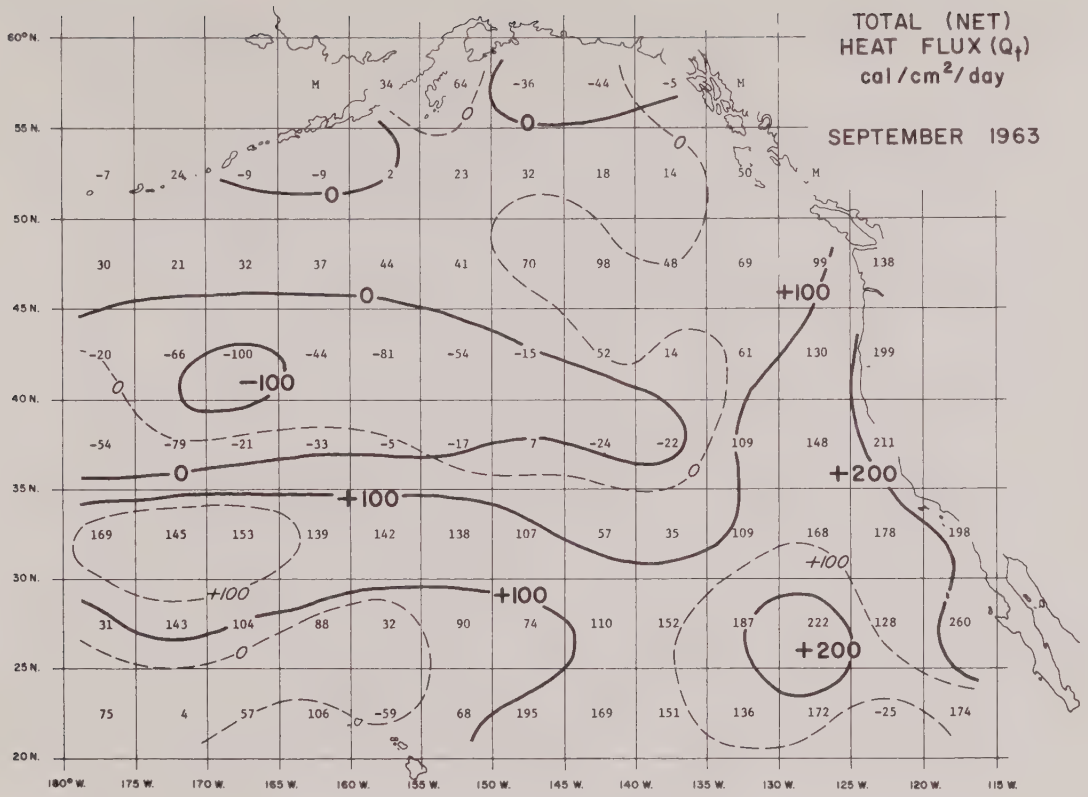

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
APRIL 1963
60°N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N
180° W
175 W.
170 W.
165 W
160 W
155 W
150 W.
145 W
140 W
135 W
130 W
125 W.
120 W.
115 W.
+100
0
+200

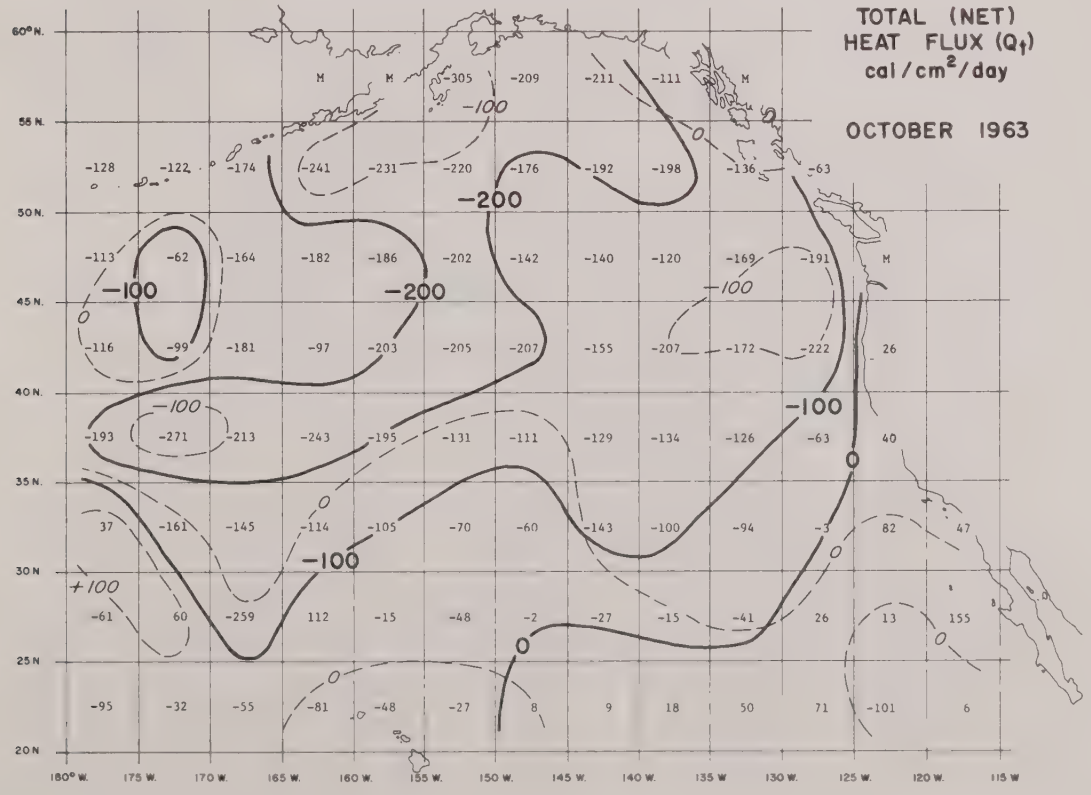

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
MAY 1963
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+200
+100
0
-100

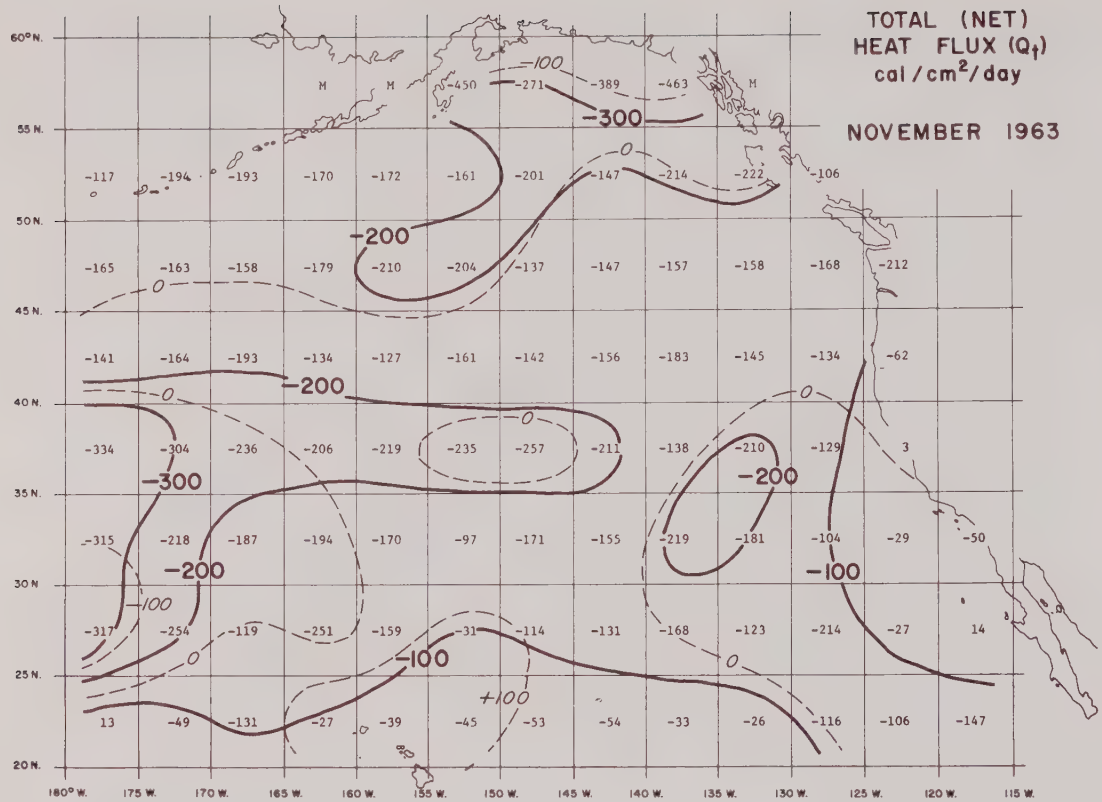

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JUNE 1963
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+300
+200
+100
0
-100


TOTAL (NET)
HEAT FLUX (Q_t)
cal/cm²/day
JULY 1963
60°N.
55 N.
50 N.
45 N
40 N.
35 N
30 N.
25 N.
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+300
+200
+100
0
-100


TOTAL (NET)
HEAT FLUX (Q_t)
cal/cm²/day
AUGUST 1963
60°N.
55 N.
50N.
45 N.
40 N.
35 N.
30 N.
25 N
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+300
+200
+100
0
-100


TOTAL (NET)
HEAT FLUX (Q_t)
cal/cm²/day
SEPTEMBER 1963
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.


TOTAL (NET)
HEAT FLUX (Q_t)
cal/cm²/day
OCTOBER 1963
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2/ day
NOVEMBER 1963
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-100
-300
-200
0
-200
-300
-200
-100
-100
+100
M M M
-450 -271 -389 -463
-117 -194 -193 -170 -172 -161 -201 -147 -214 -222 -106
-165 -163 -158 -179 -210 -204 -137 -147 -157 -158 -168 -212
-141 -164 -193 -134 -127 -161 -142 -156 -183 -145 -134 -62
-334 -304 -236 -206 -219 -235 -257 -211 -138 -210 -129 3
-315 -218 -187 -194 -170 -97 -171 -155 -219 -181 -104 -29 -50
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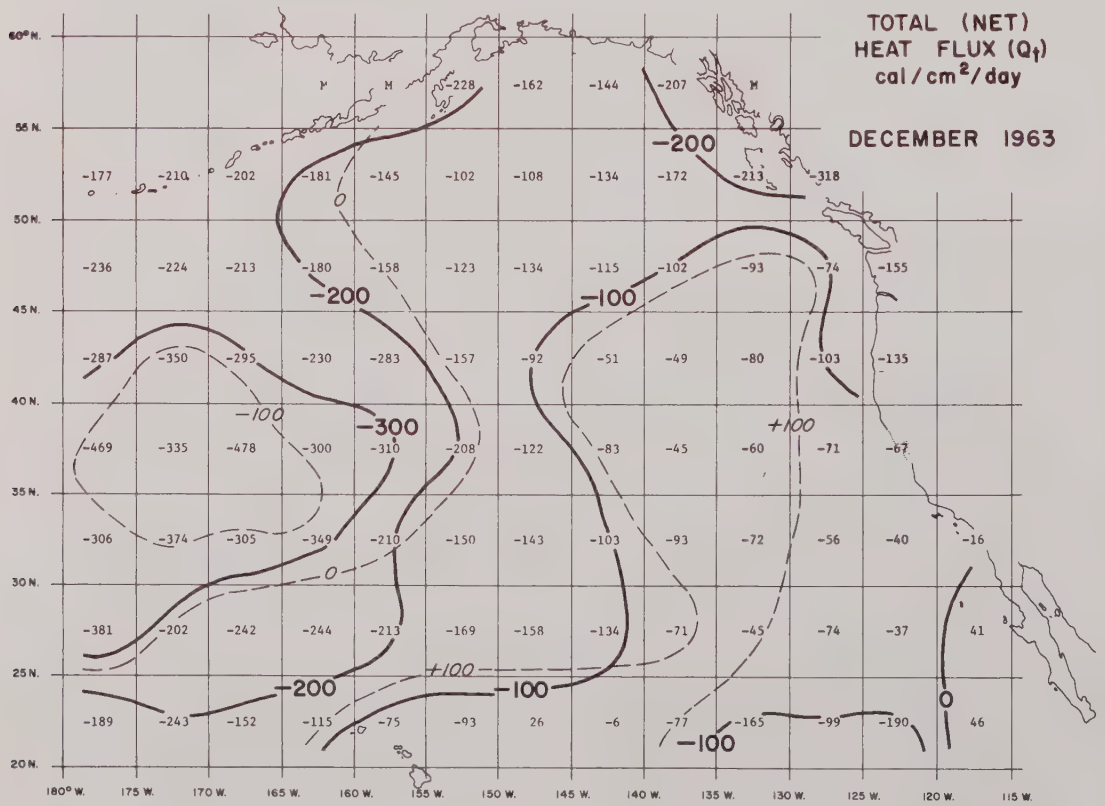
13 -49 -131 -27 -39 -45 -53 -54 -33 -26 -116 -106 -147


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2/ day
DECEMBER 1963
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-200
0
-200
-100
-300
-100
+100
-200
-100
+100
-100
M M M
-228 -162 -144 -207
-177 -210 -202 -181 -145 -102 -108 -134 -172 -213 -318
-236 -224 -213 -180 -158 -123 -134 -115 -102 -93 -74 -155
-287 -350 -295 -230 -283 -157 -92 -51 -49 -80 -103 -135
-469 -335 -478 -300 -310 -208 -122 -83 -45 -60 -71 -67
-306 -374 -305 -349 -210 -150 -143 -103 -93 -72 -56 -40 -16
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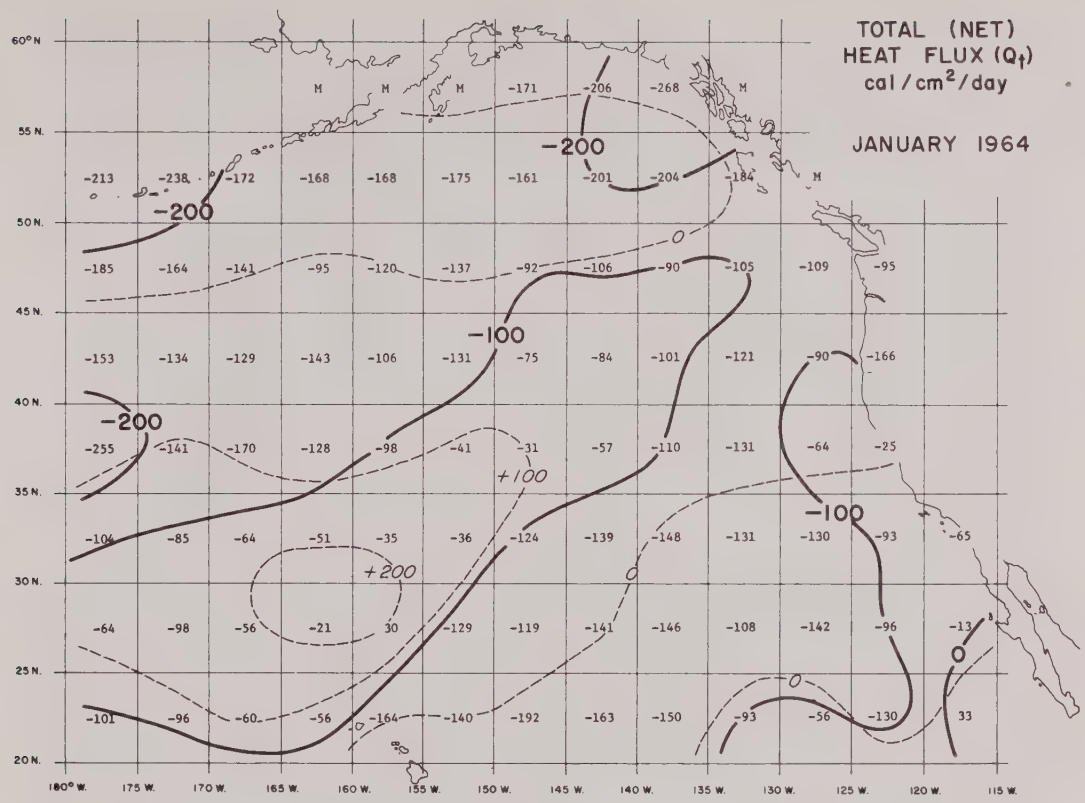
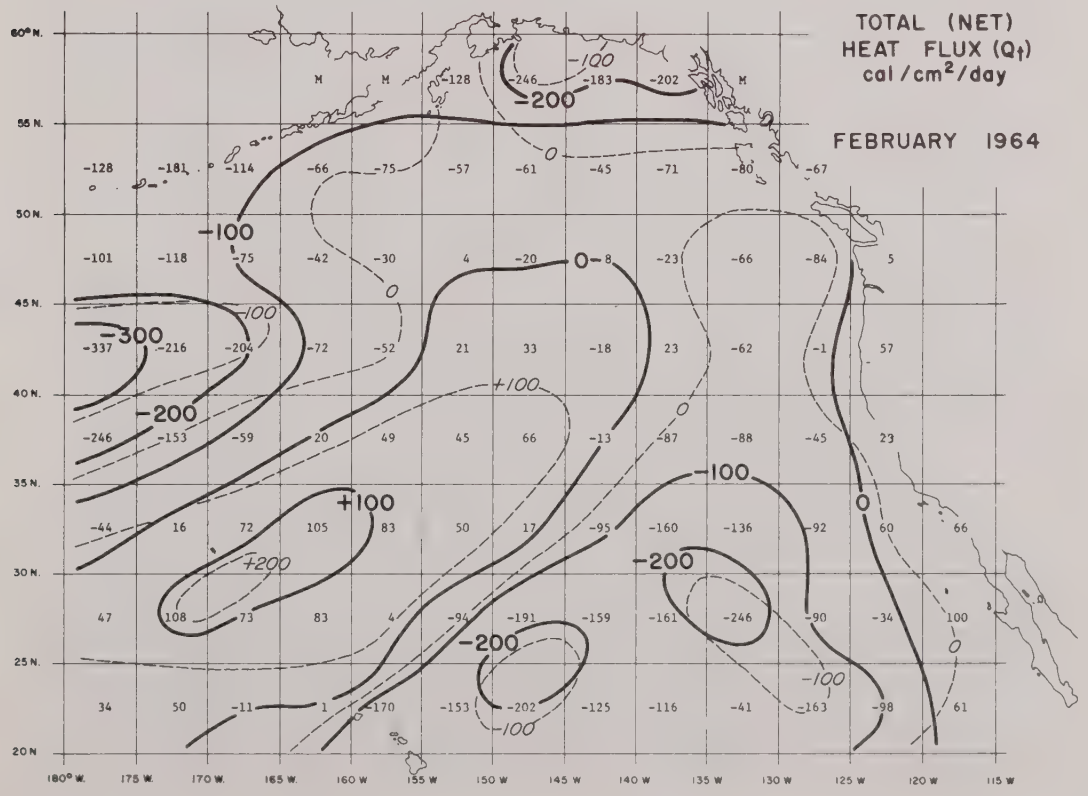
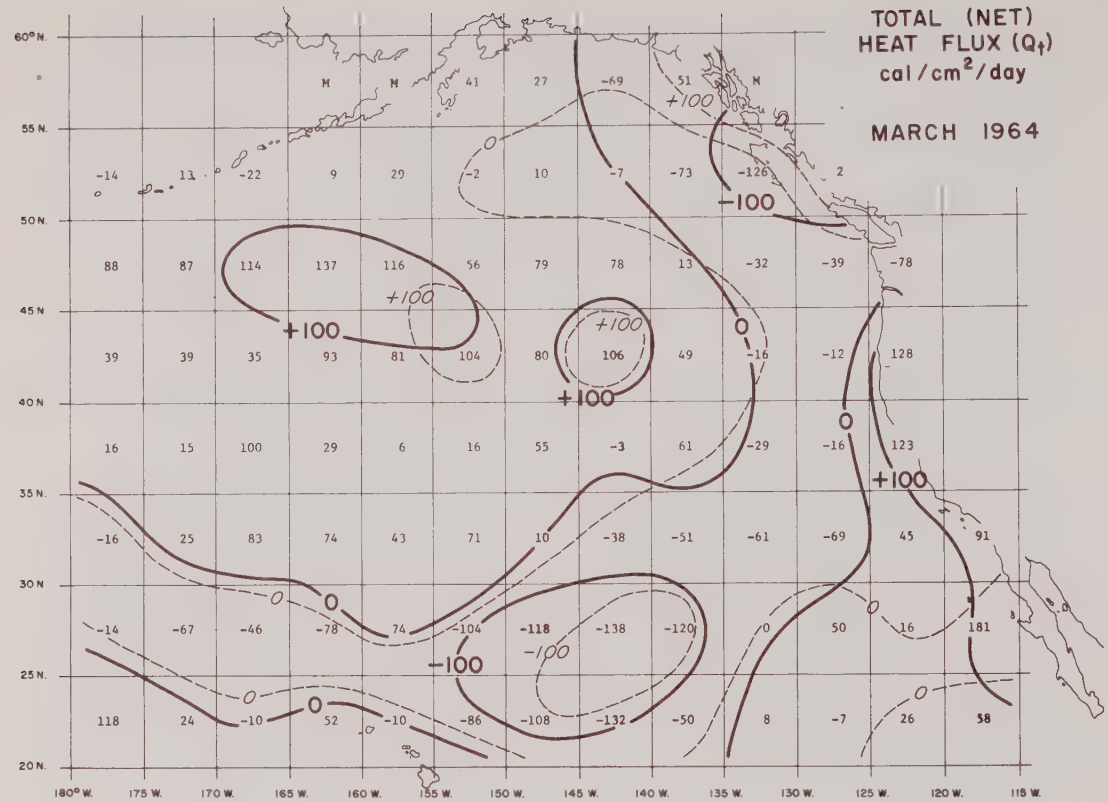
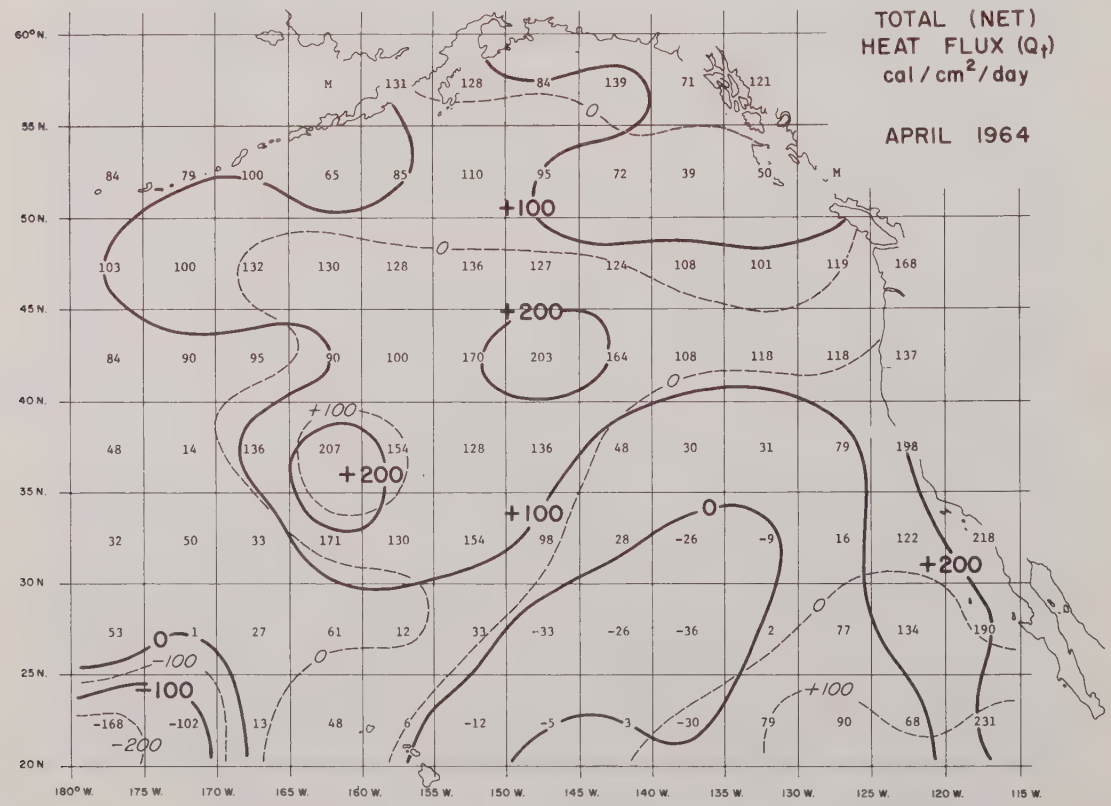
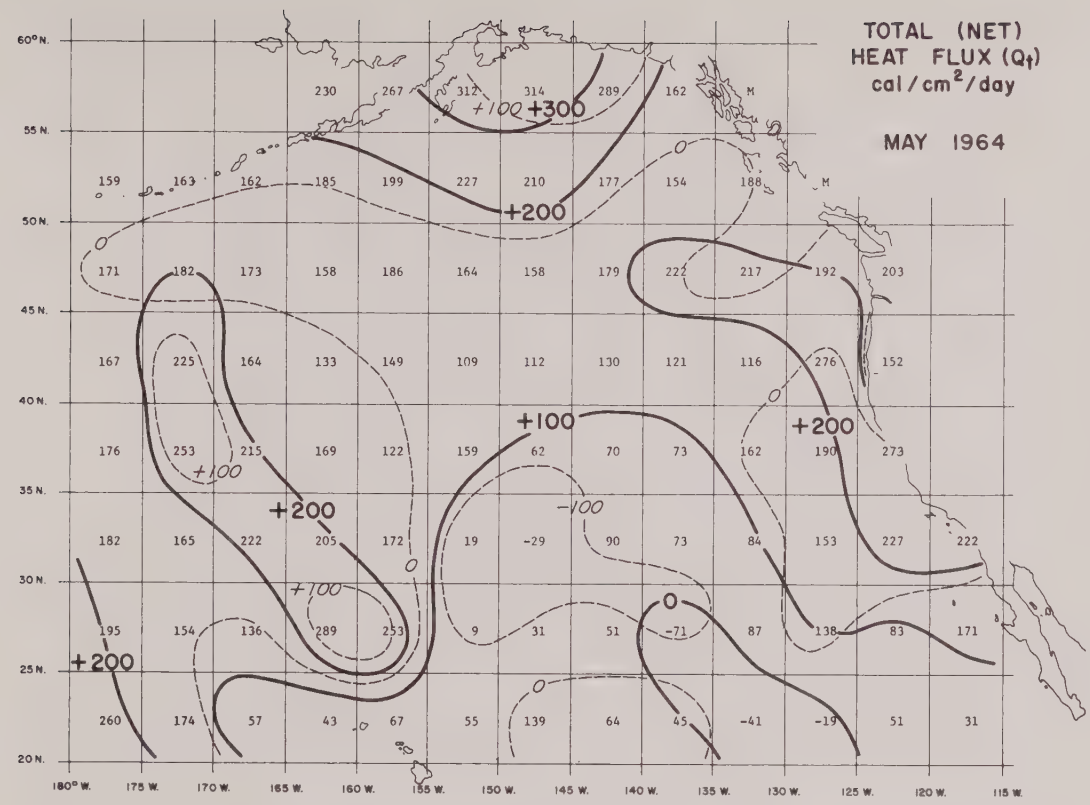

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm² / day
JANUARY 1964
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm² / day
FEBRUARY 1964
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
MARCH 1964
60° N.
55 N.
50 N.
45 N
40 N
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
APRIL 1964
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N.
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
MAY 1964
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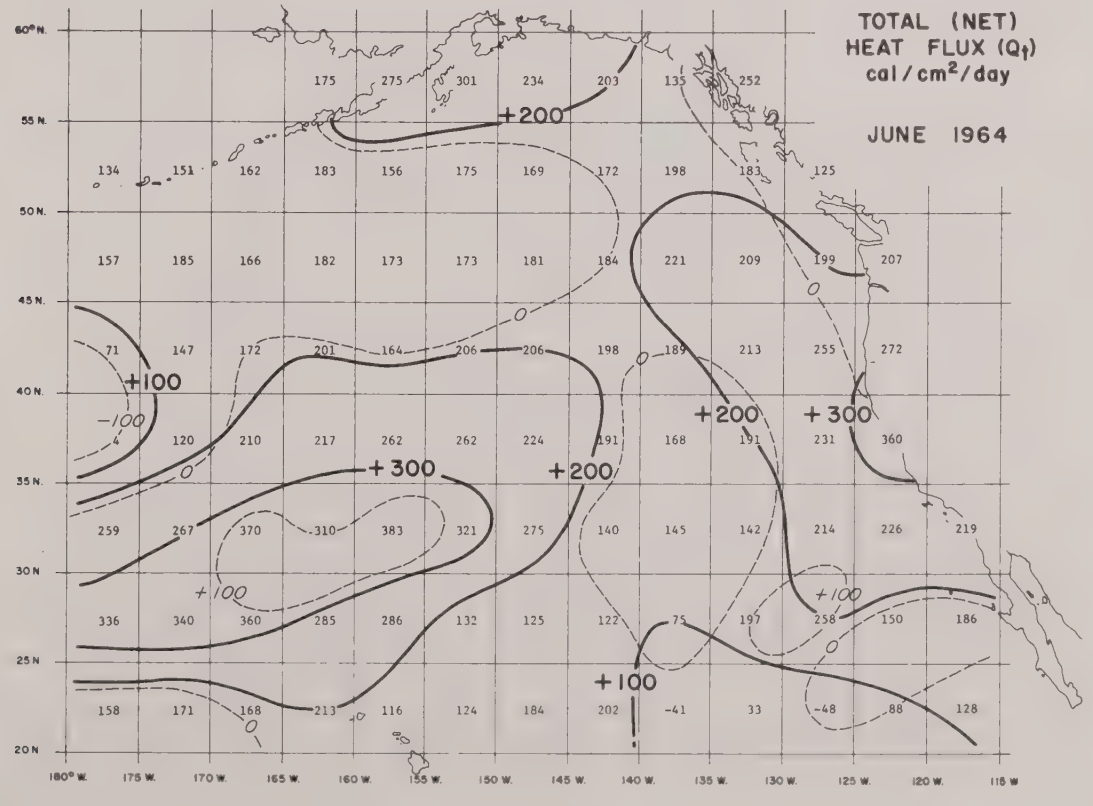
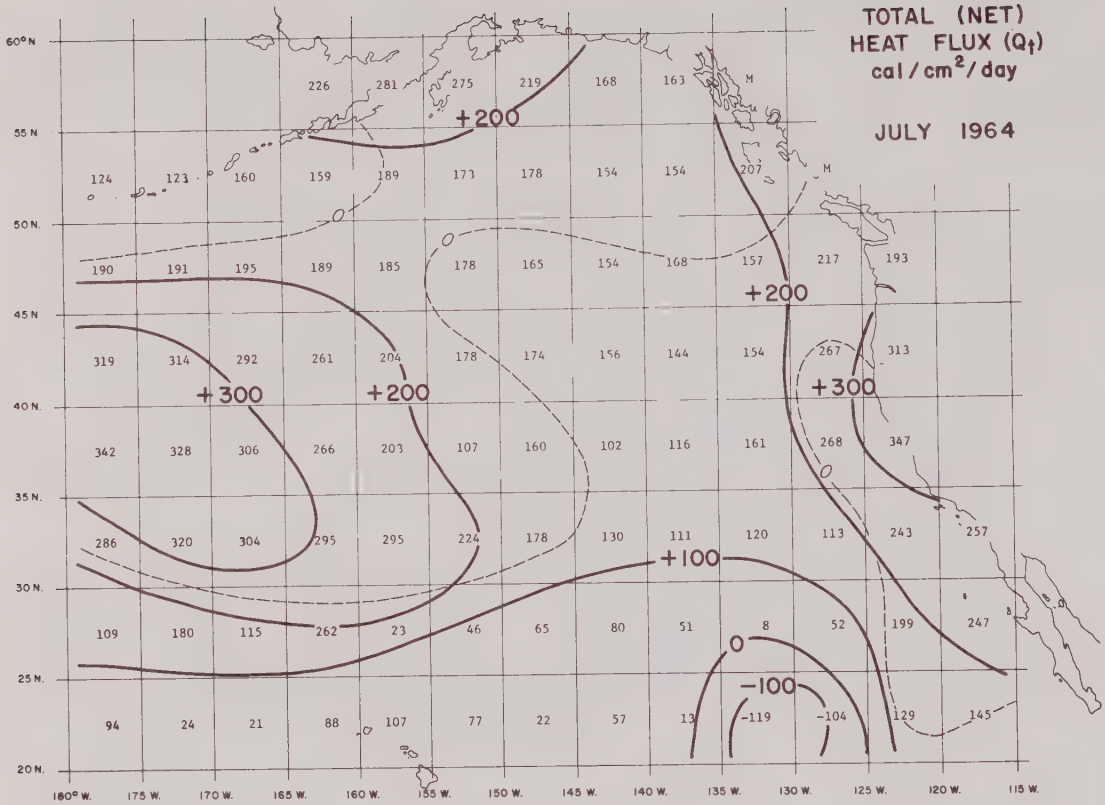
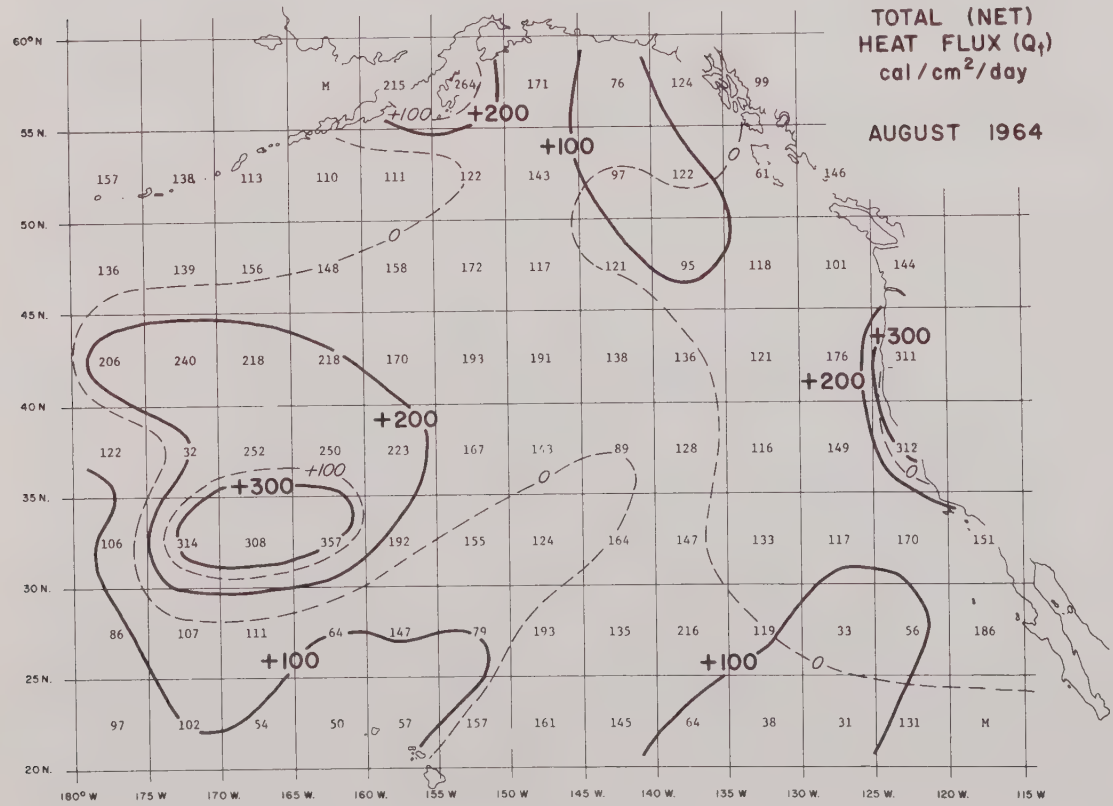
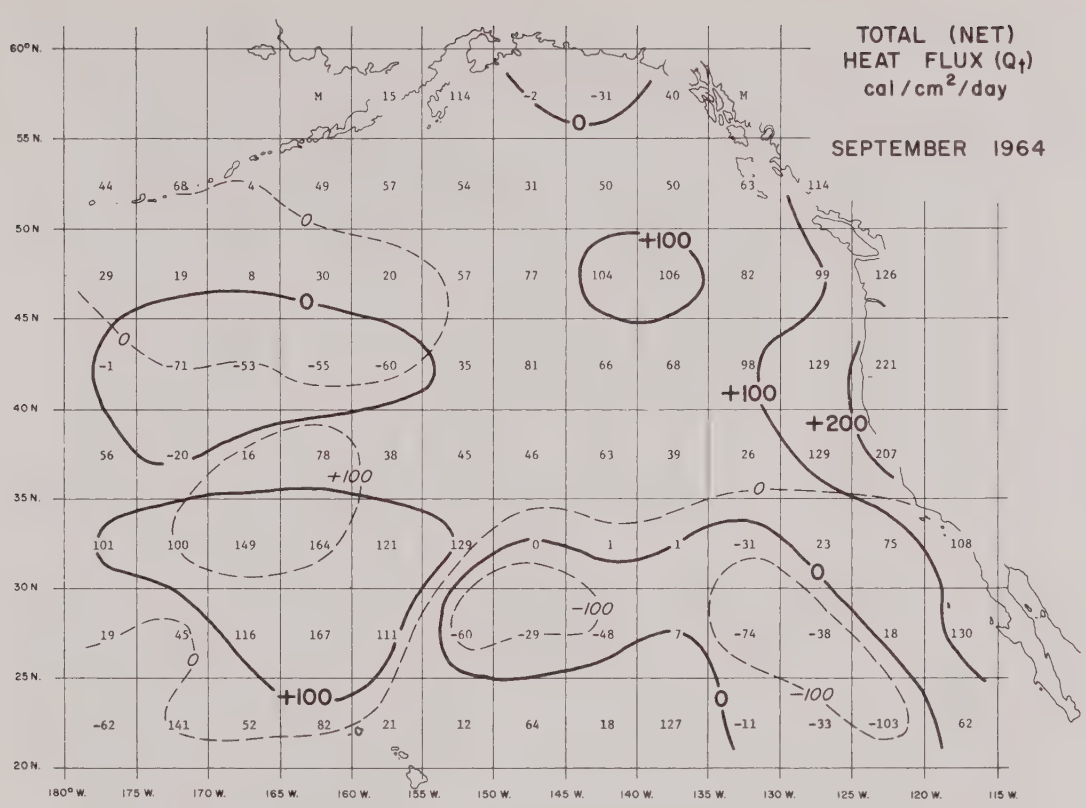
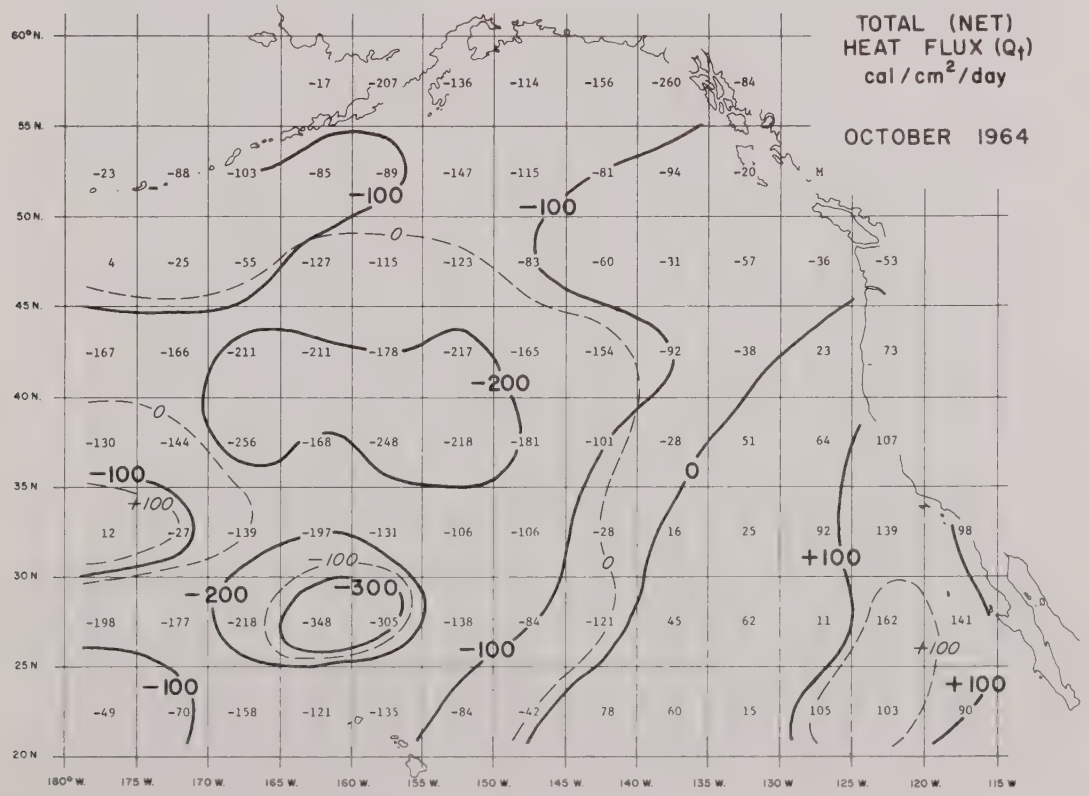
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+300
+200
+100
0
-100

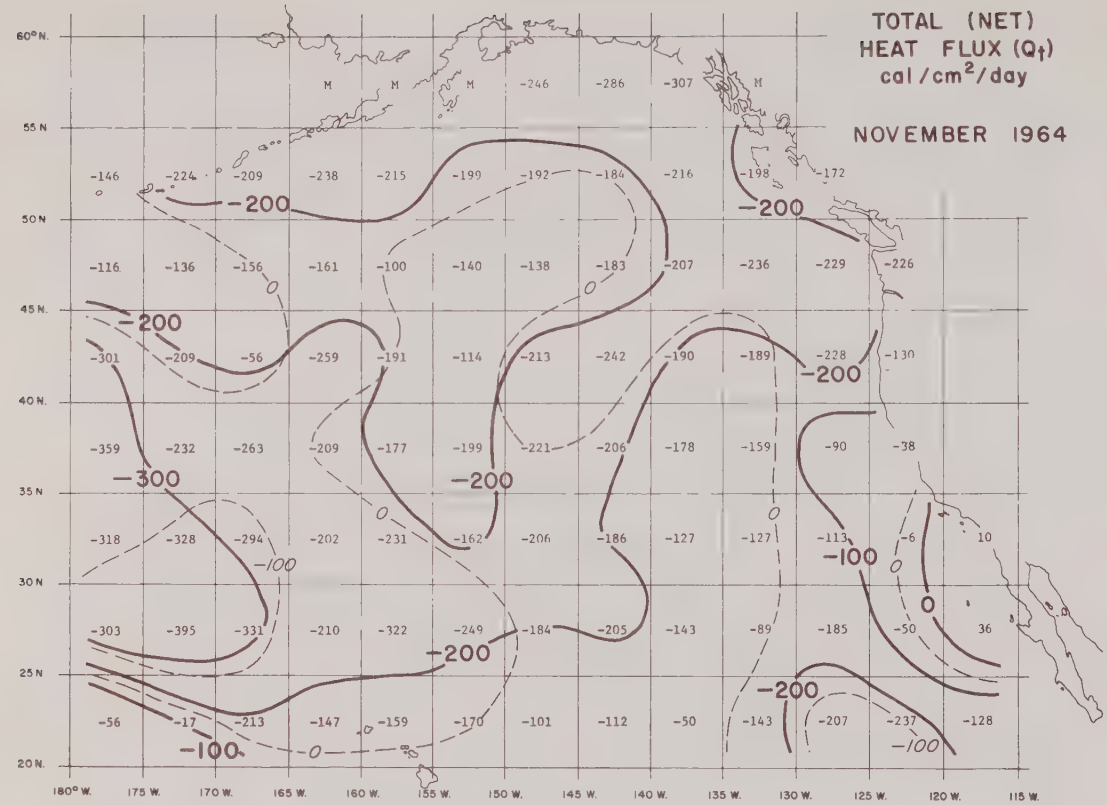

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JUNE 1964
60°N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W
+300
+200
+100
0
-100

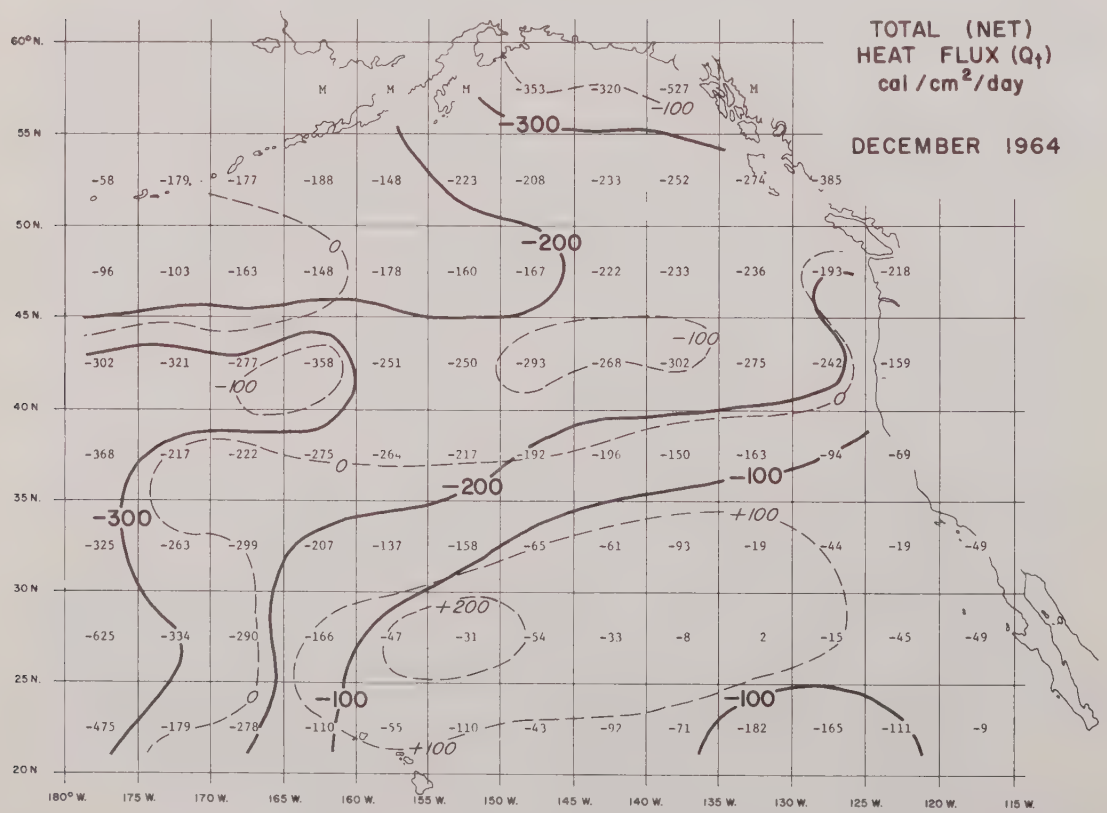

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JULY 1964
60° N
55 N.
50 N.
45 N
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+200
+300
+200
+300
+100
0
-100

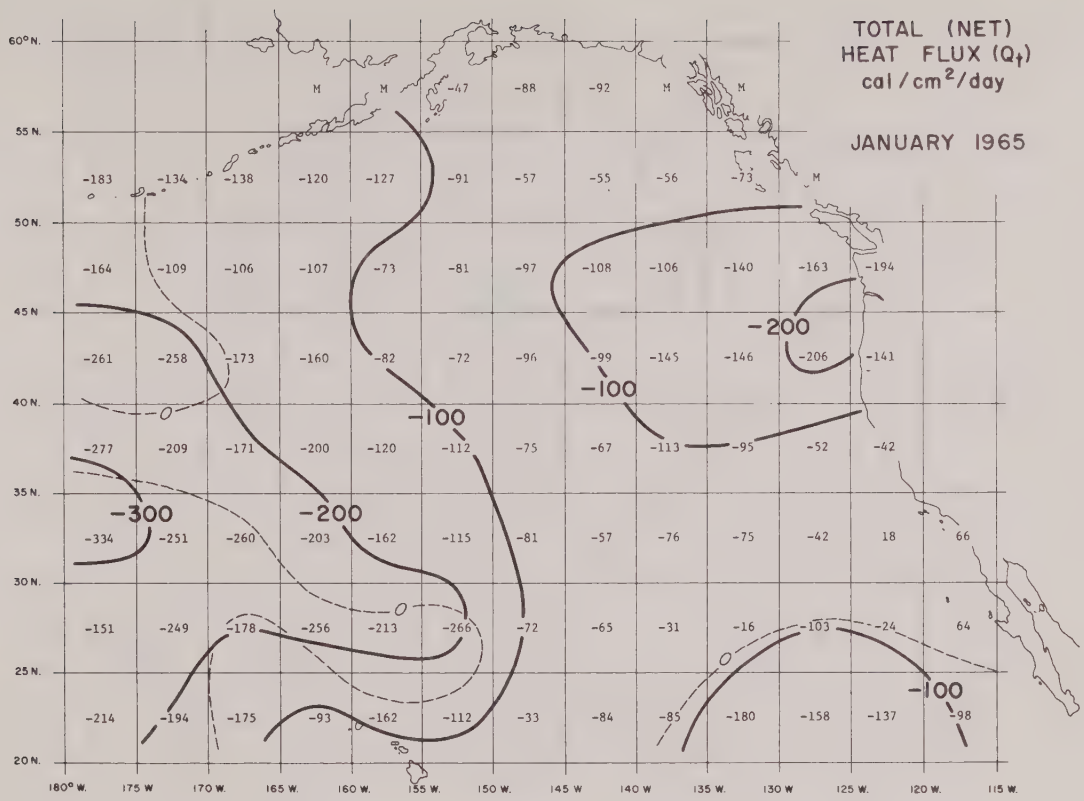

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
AUGUST 1964
60° N
55 N.
50 N.
45 N.
40 N
35 N.
30 N.
25 N.
20 N.
180° W
175 W
170 W.
165 W.
160 W.
155 W
150 W
145 W.
140 W.
135 W
130 W.
125 W.
120 W.
115 W
+100
+200
+100
+300
+200
+200
+100
+300
+100
+100

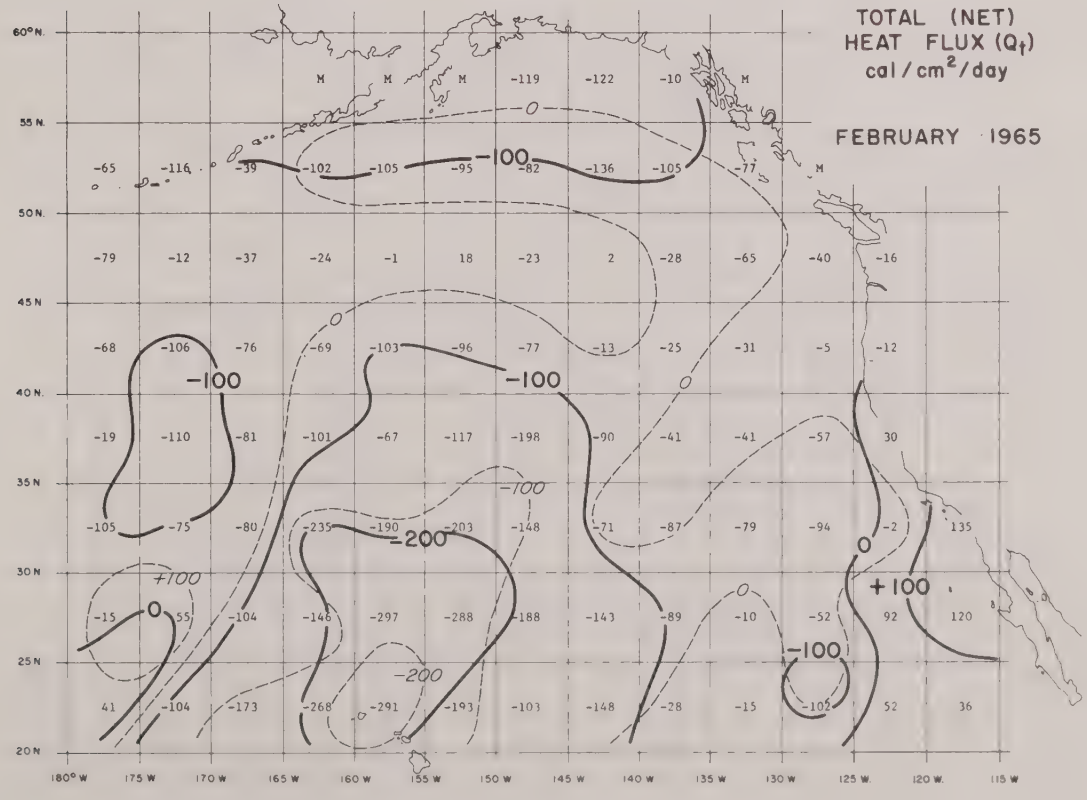

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
SEPTEMBER 1964
60° N.
55 N.
50 N
45 N
40 N
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W
0
+100
+200
-100

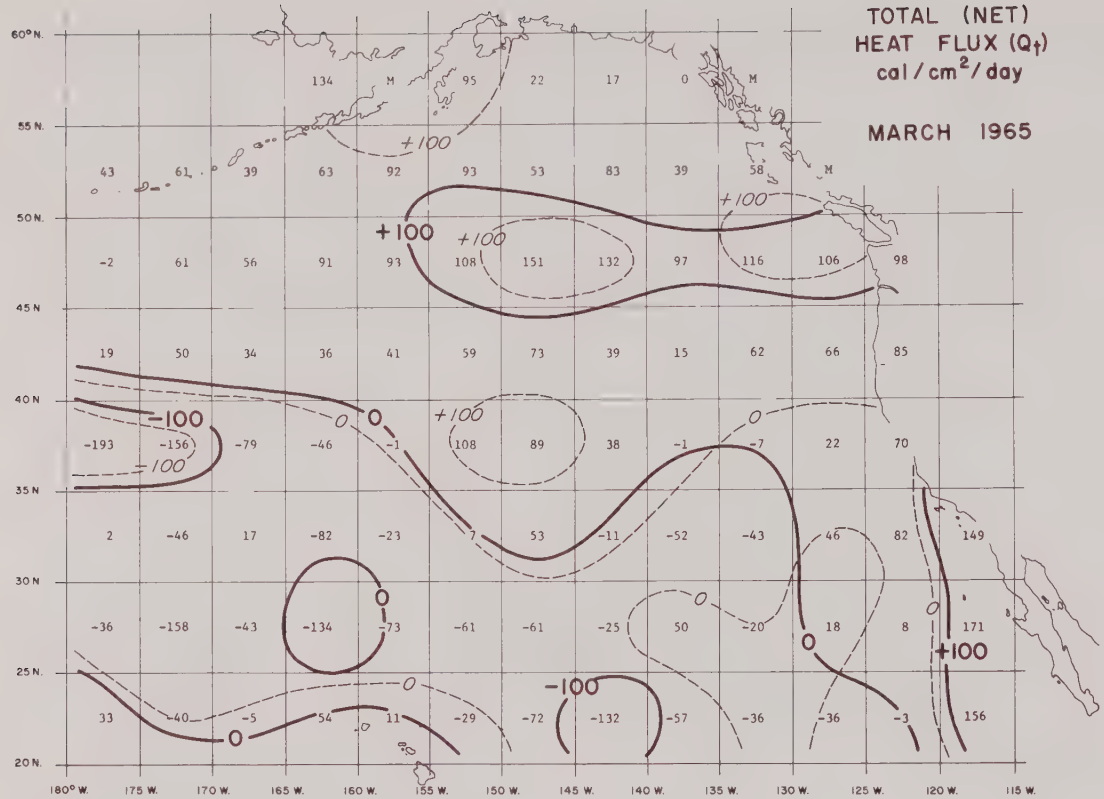

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
OCTOBER 1964
60° N.
55 N.
50 N.
45 N.
40 N.
35 N
30 N
25 N
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W
125 W.
120 W.
115 W
0
+100
-100
-200
-300

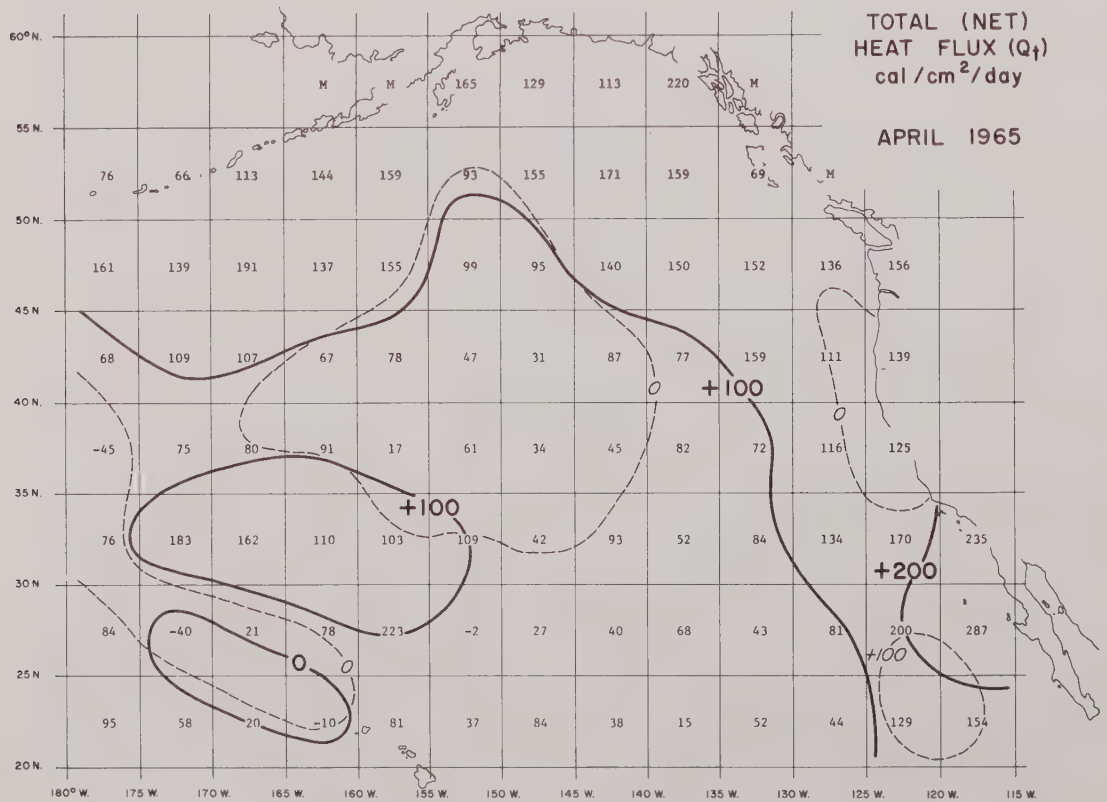

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
NOVEMBER 1964
60° N.
55 N
50 N
45 N.
40 N.
35 N
30 N
25 N
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

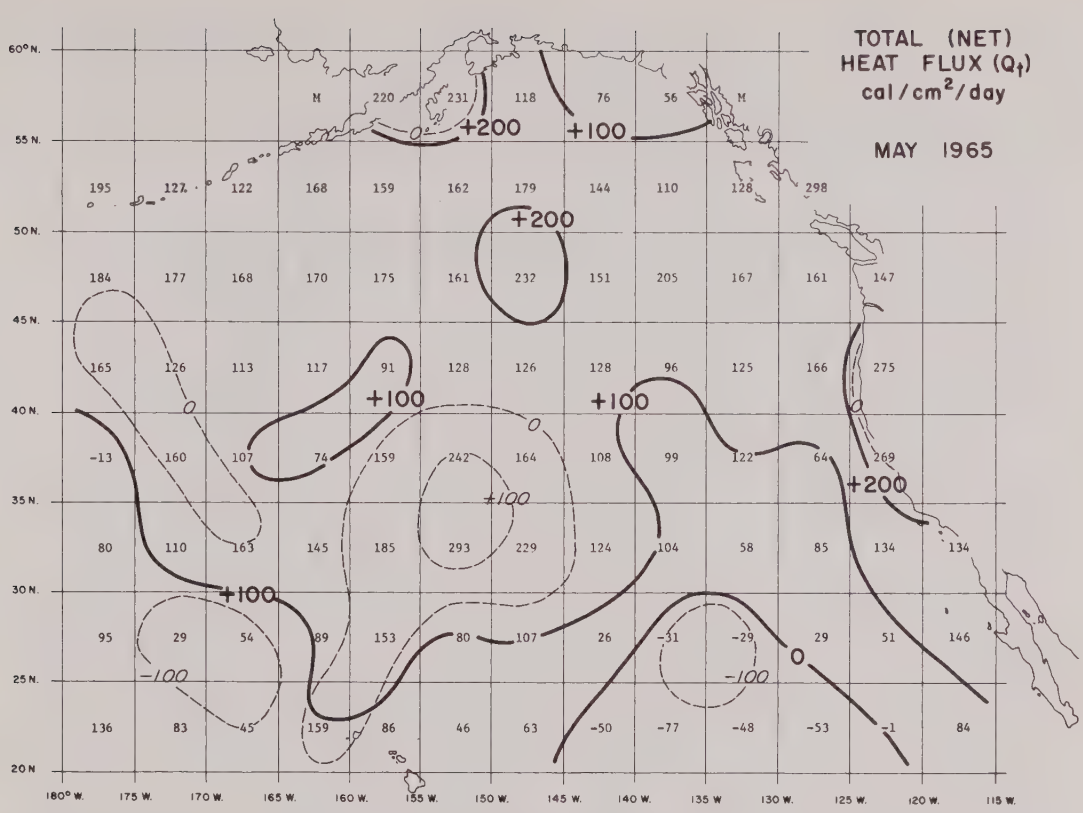

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
DECEMBER 1964
60° N.
55 N
50 N.
45 N.
40 N
35 N.
30 N
25 N.
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

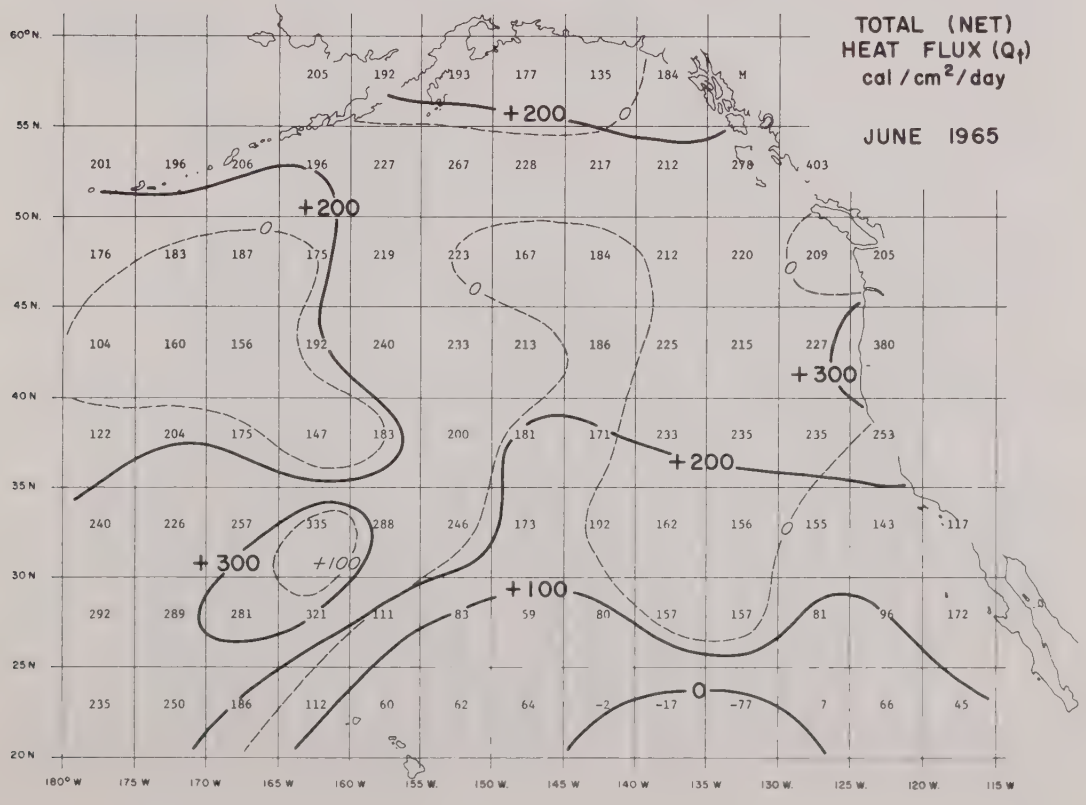

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JANUARY 1965
60° N.
55 N.
50 N.
45 N
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W
170 W.
165 W.
160 W.
155 W.
150 W.
145 W
140 W
135 W.
130 W
125 W.
120 W.
115 W.
-300
-200
-100
0

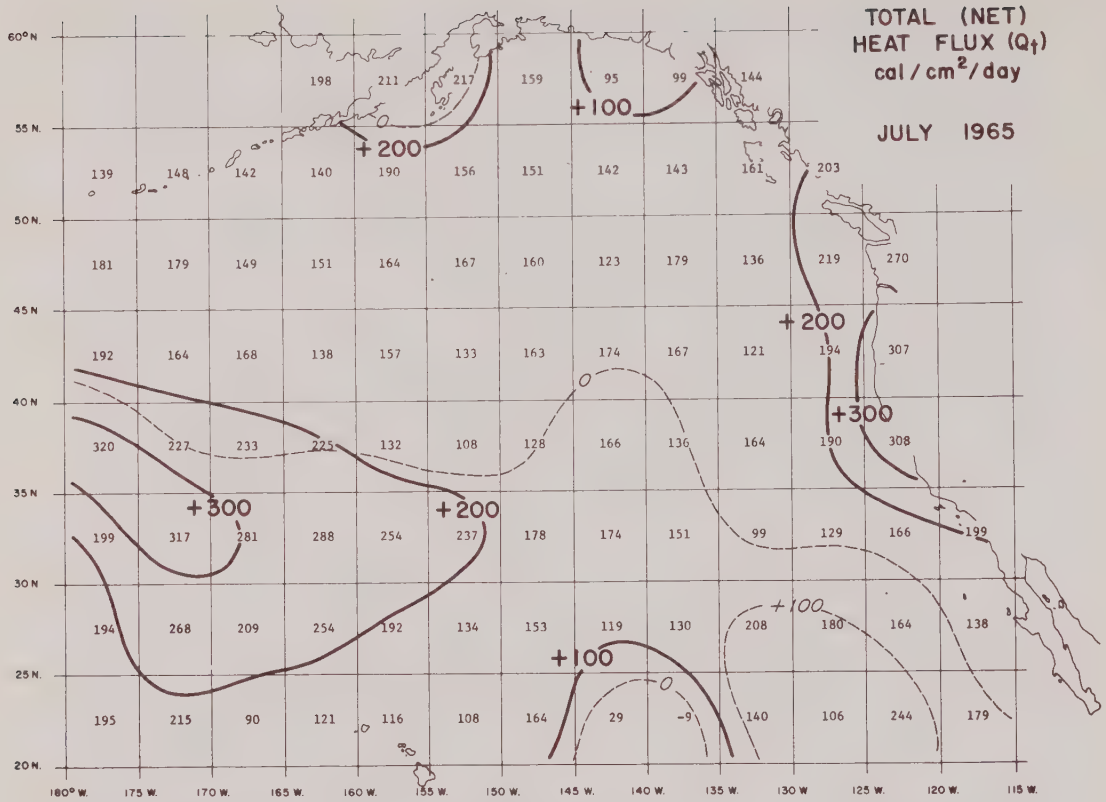

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
FEBRUARY 1965
60° N.
55 N.
50 N.
45 N
40 N.
35 N
30 N
25 N
20 N
180° W
175 W
170 W
165 W
160 W
155 W
150 W
145 W
140 W
135 W
130 W
125 W.
120 W.
115 W
-200
-100
0
+100

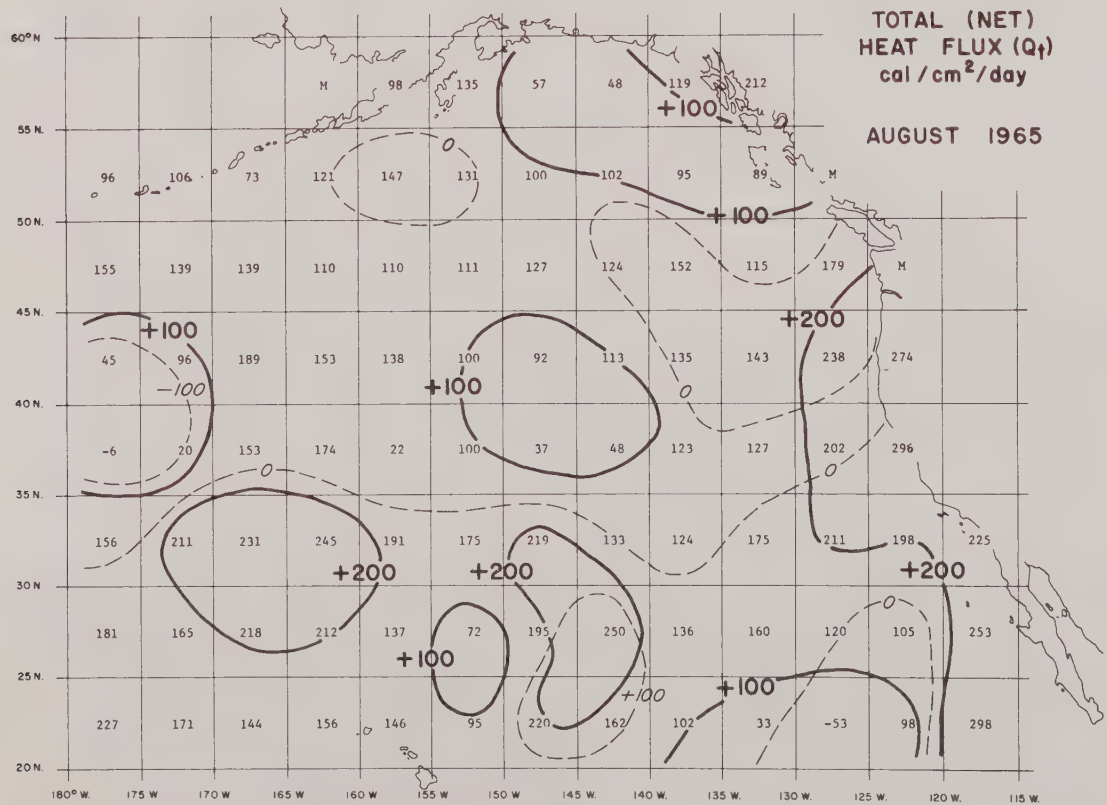

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
MARCH 1965
60° N.
55 N.
50 N.
45 N
40 N
35 N
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+100
-100
0

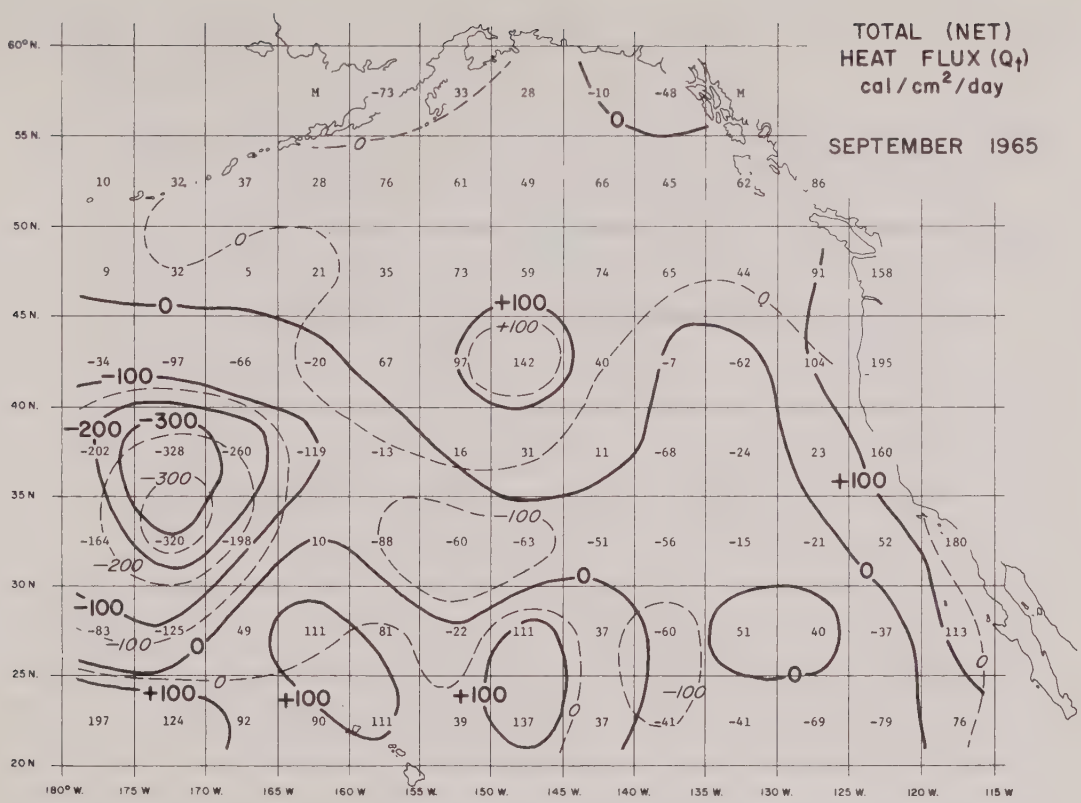

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
APRIL 1965
60° N.
55 N.
50 N.
45 N
40 N.
35 N.
30 N
25 N
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+100
+200
0

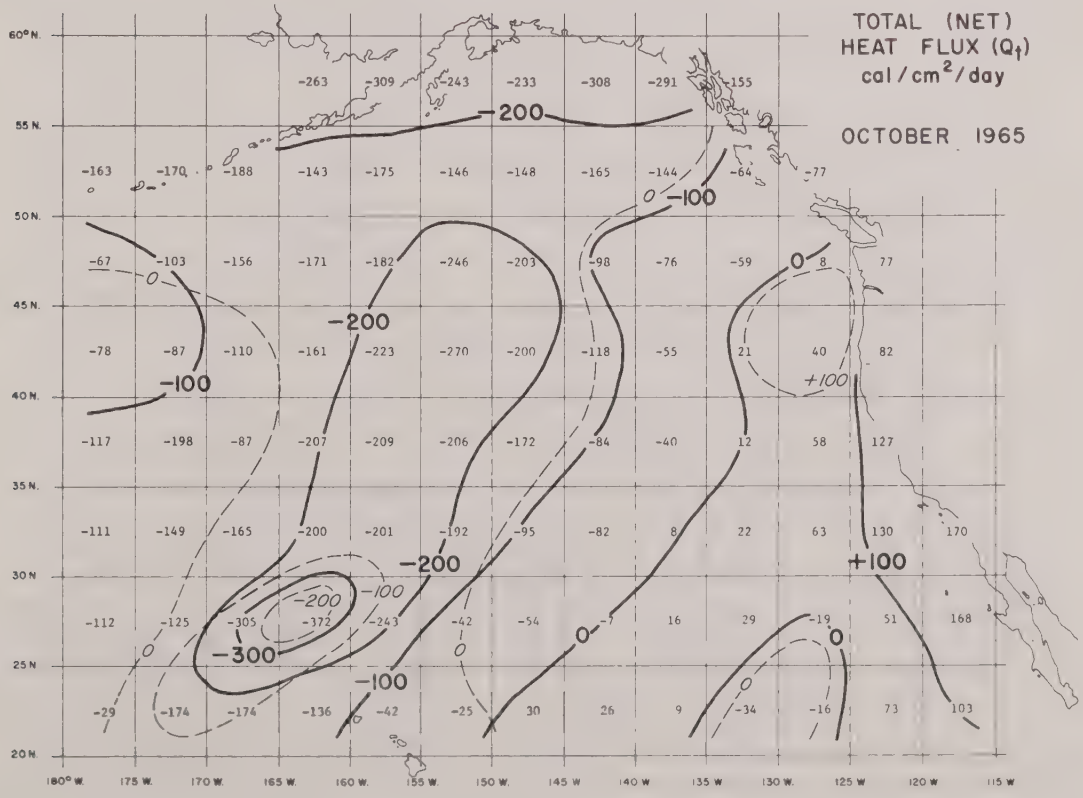

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm² / day
MAY 1965
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W
130 W.
125 W.
120 W.
115 W.
+200
+100
0
-100

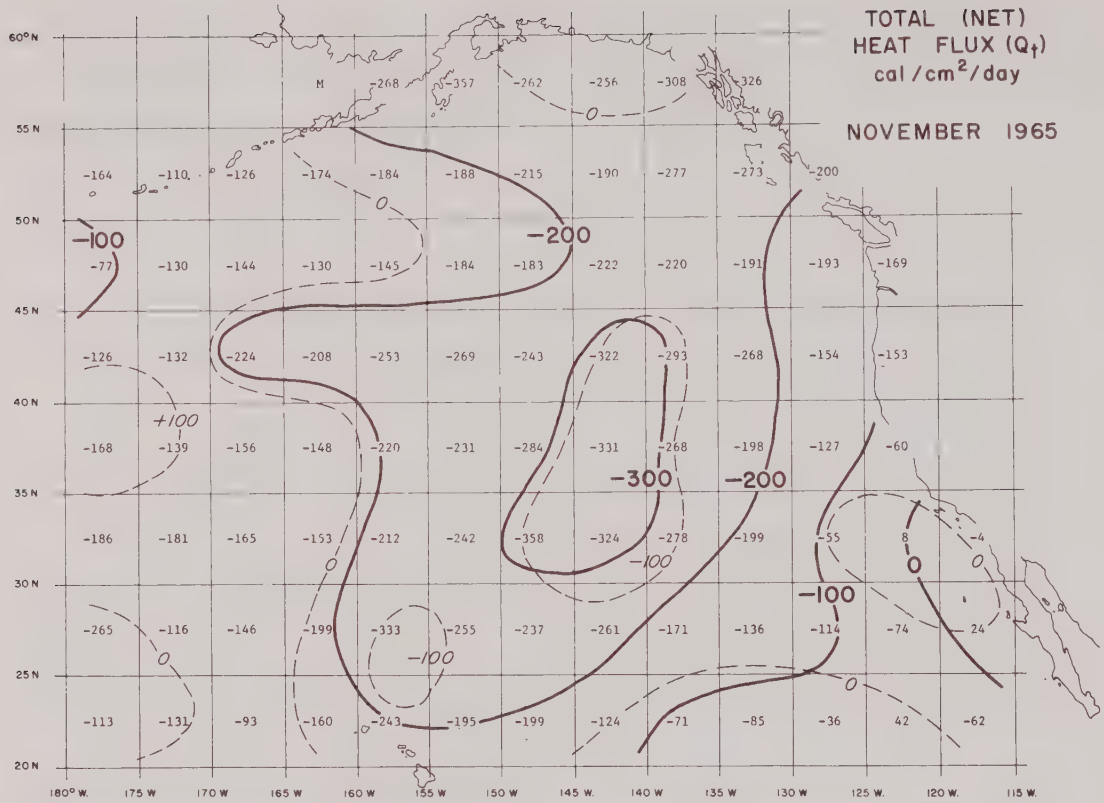

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm² / day
JUNE 1965
60° N.
55 N.
50 N.
45 N.
40 N
35 N
30 N
25 N
20 N
180° W
175 W
170 W
165 W
160 W
155 W.
150 W.
145 W
140 W
135 W
130 W.
125 W.
120 W.
115 W
+300
+200
+100
0

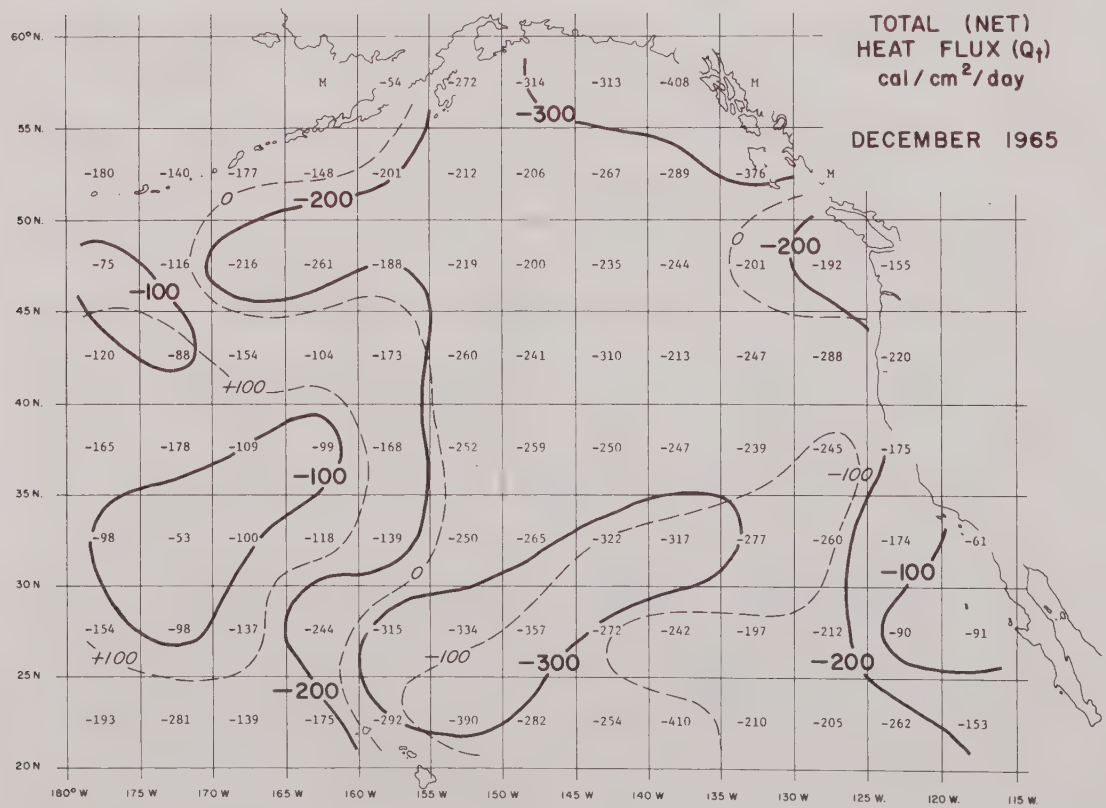

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JULY 1965
60° N
55 N.
50 N.
45 N
40 N
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W
125 W.
120 W.
115 W.
+100
+200
+300
0
-100

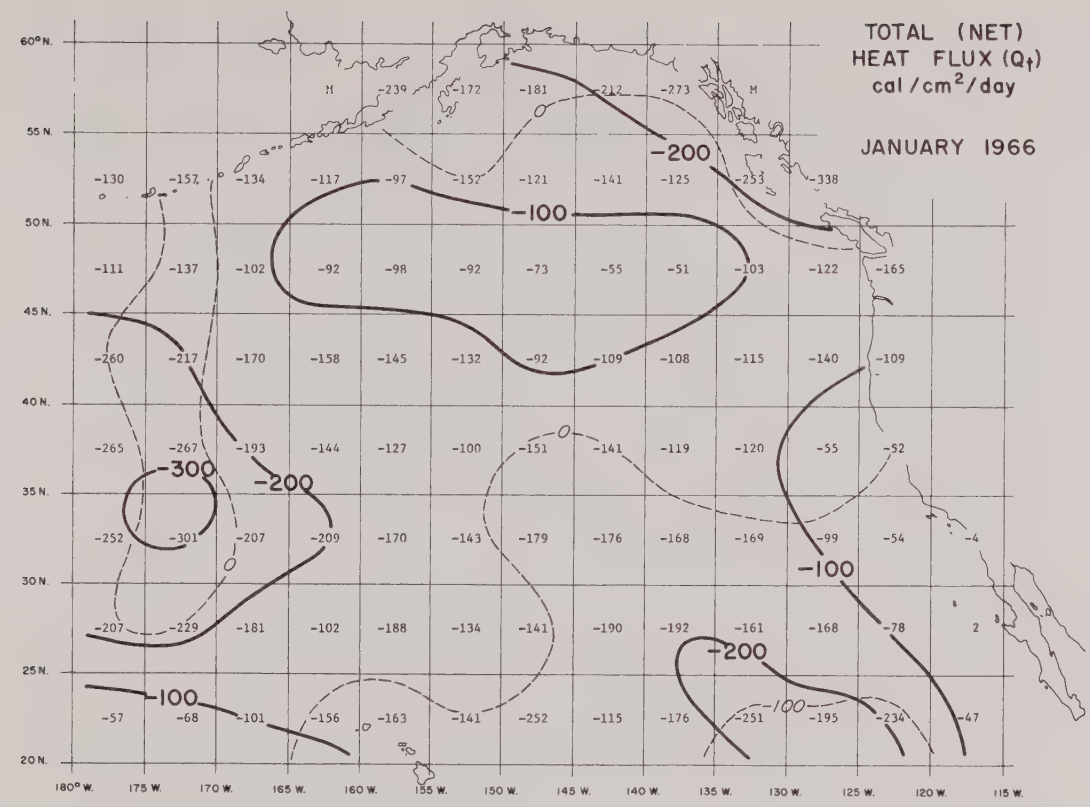

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
AUGUST 1965
60° N
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N.
20 N.
180° W.
175 W
170 W
165 W
160 W
155 W
150 W
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+100
+200
0
-100

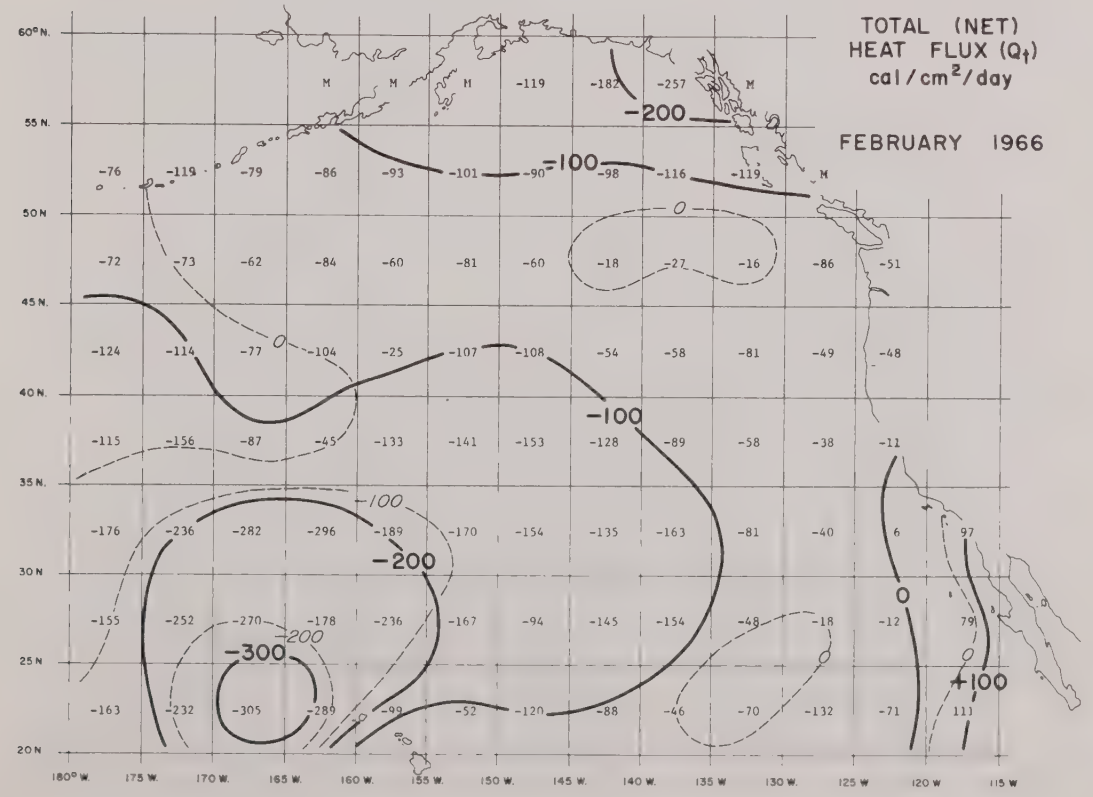

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
SEPTEMBER 1965
60° N.
55 N.
50 N.
45 N.
40 N.
35 N
30 N
25 N.
20 N
180° W.
175 W
170 W.
165 W
160 W
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W

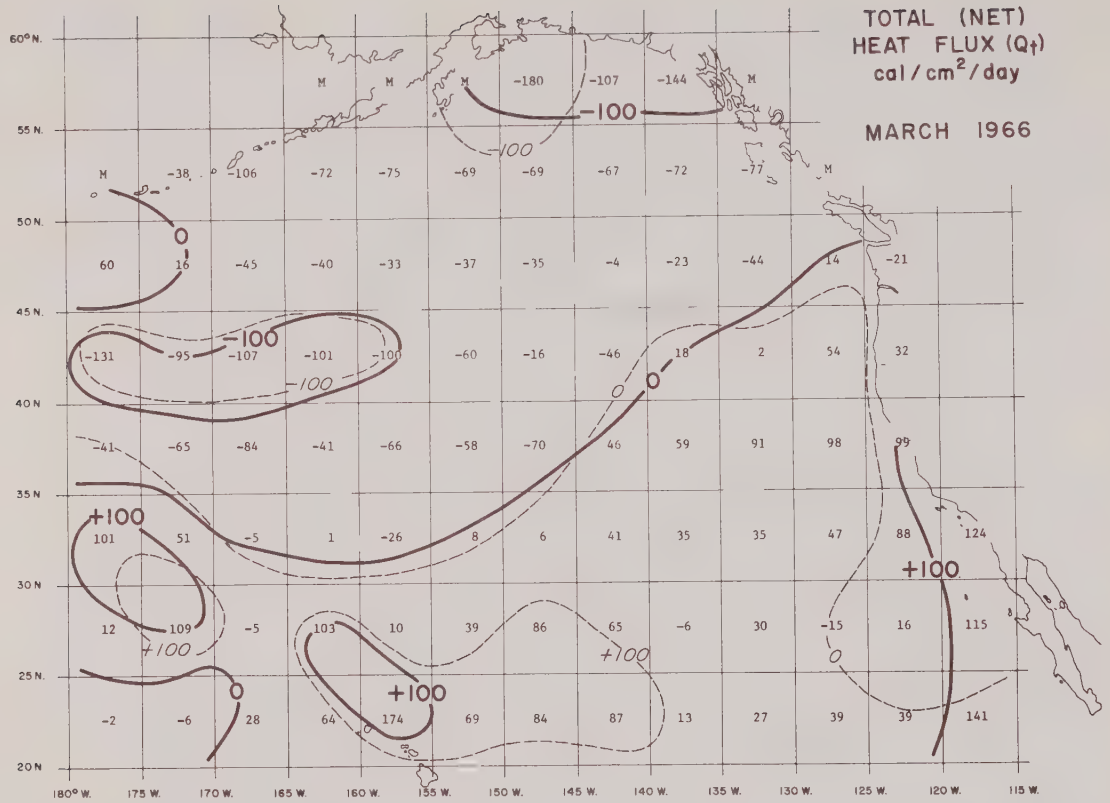

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
OCTOBER 1965
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W
140 W.
135 W
130 W.
125 W
120 W
115 W

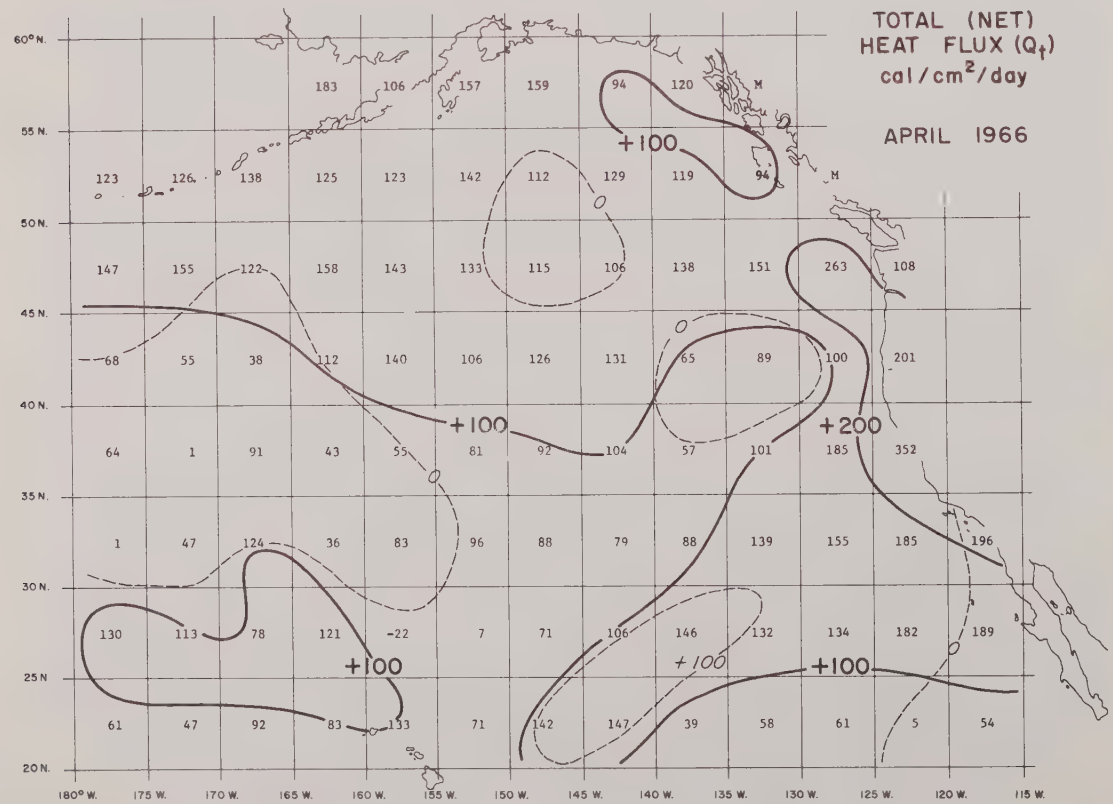

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
NOVEMBER 1965
60° N
55 N
50 N
45 N
40 N
35 N
30 N
25 N
20 N
180° W.
175 W
170 W
165 W
160 W
155 W
150 W
145 W.
140 W
135 W
130 W
125 W.
120 W.
115 W.

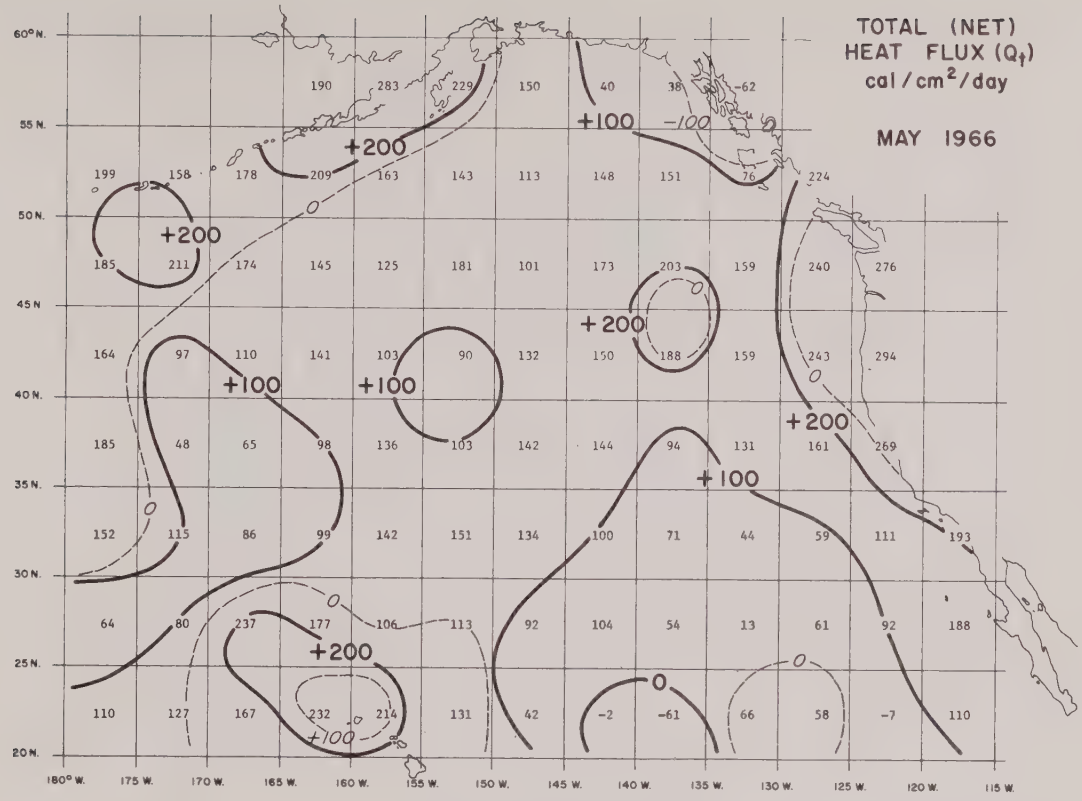

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
DECEMBER 1965
60° N.
55 N.
50 N.
45 N
40 N.
35 N.
30 N
25 N
20 N
180° W
175 W
170 W
165 W
160 W
155 W
150 W
145 W
140 W
135 W
130 W
125 W.
120 W.
115 W.

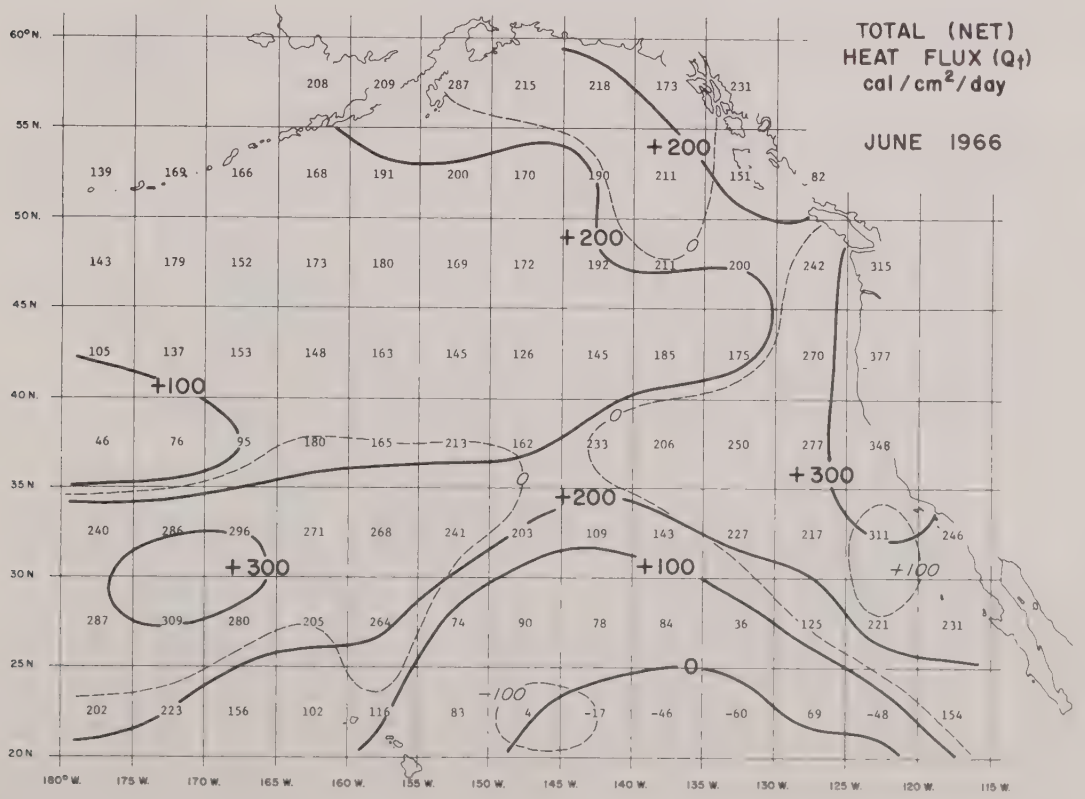

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JANUARY 1966
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-200
-100
-300
0

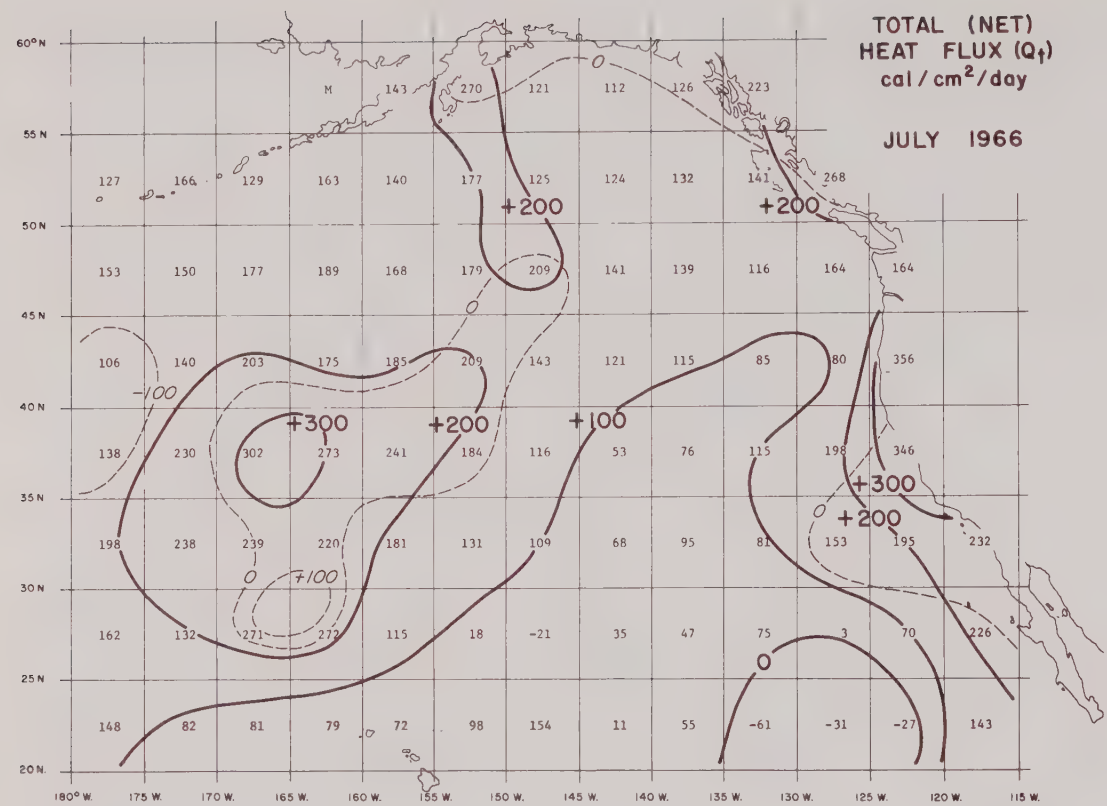

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
FEBRUARY 1966
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-200
-100
-300
0
+100

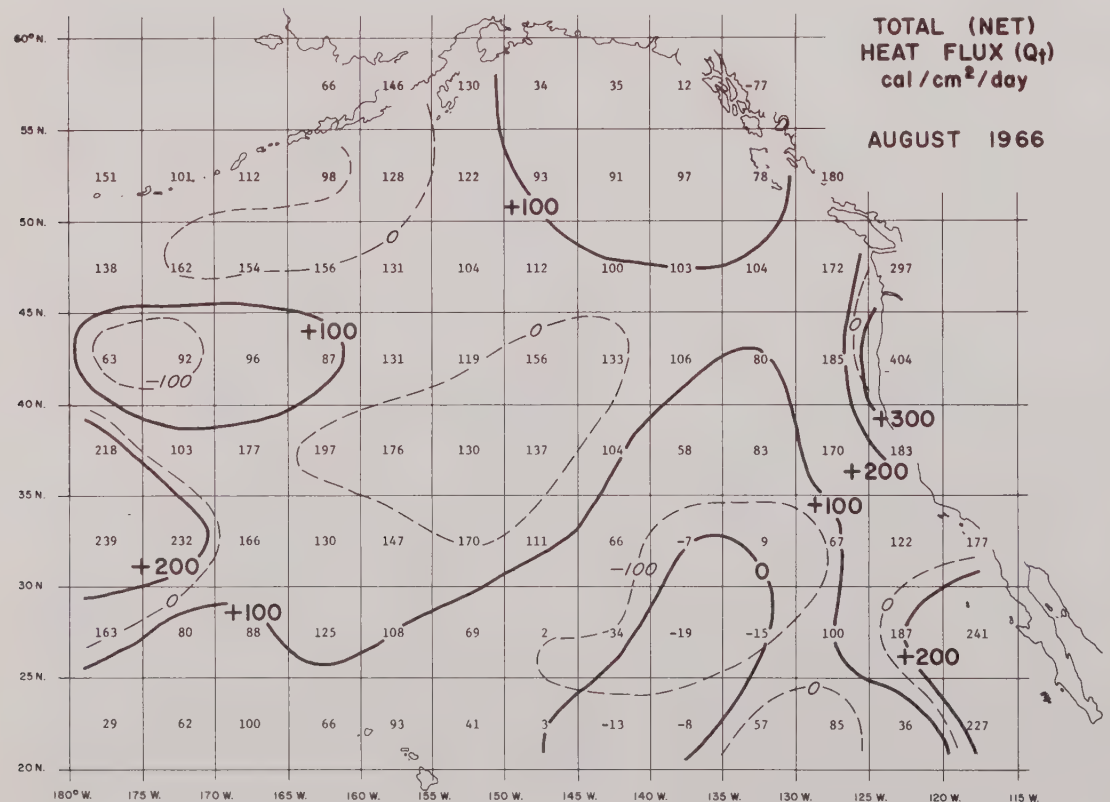

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
MARCH 1966
60°N.
55 N.
50N.
45 N.
40 N
35 N
30 N
25 N.
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-100
+100
0

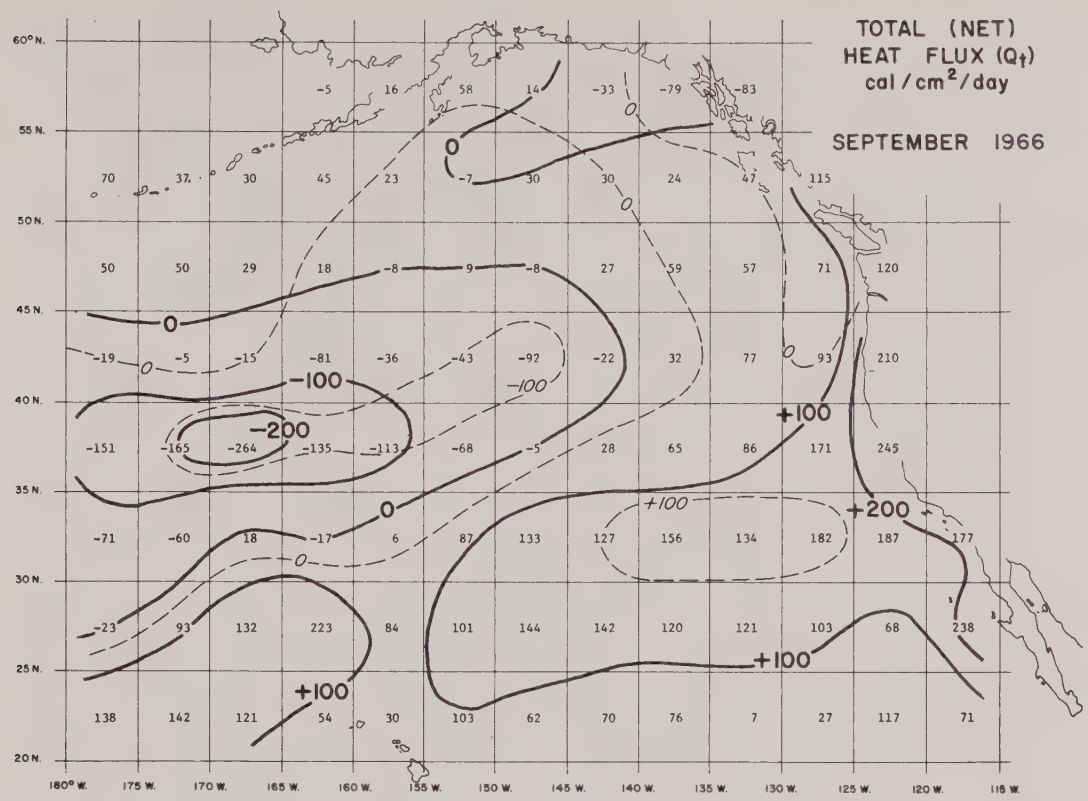

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
APRIL 1966
60°N.
55 N.
50N.
45 N.
40 N.
35 N.
30 N.
25 N
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+100
+200
0

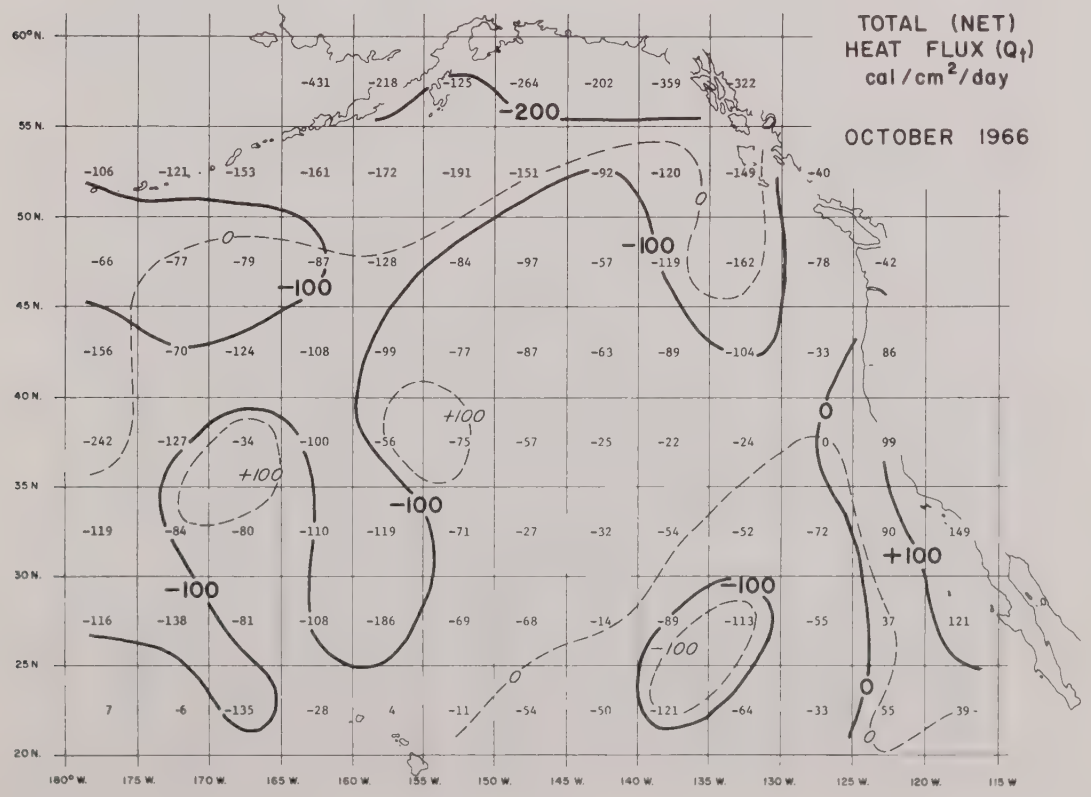

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
MAY 1966
60° N.
55 N.
50 N.
45 N
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+200
+100
0
190 283 229 150 40 38 -62
199 158 178 209 163 143 113 148 151 76 224
185 211 174 145 125 181 101 173 203 159 240 276
164 97 110 141 103 90 132 150 188 159 243 294
185 48 65 98 136 103 142 144 94 131 161 269
152 115 86 99 142 151 134 100 71 44 59 111 193
64 80 237 177 106 113 92 104 54 13 61 92 188
110 127 167 232 214 131 42 -2 -61 66 58 -7 110

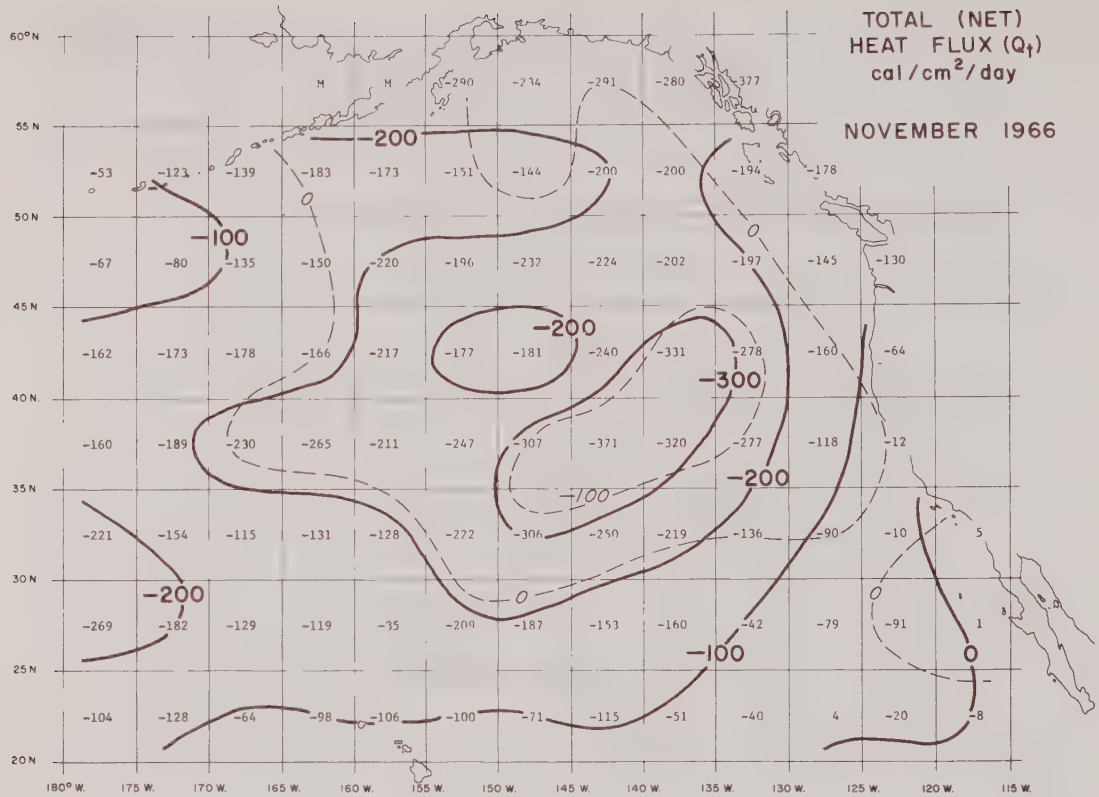

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JUNE 1966
60° N.
55 N.
50 N.
45 N
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+200
+100
+300
0
-100
208 209 287 215 218 173 231
139 169 166 168 191 200 170 190 211 151 82
143 179 152 173 180 169 172 192 211 200 242 315
105 137 153 148 163 145 126 145 185 175 270 377
46 76 95 180 165 213 162 233 206 250 277 348
240 286 296 271 268 241 203 109 143 227 217 311 246
287 309 280 205 264 74 90 78 84 36 125 221 231
202 223 156 102 116 83 4 -17 -46 -60 69 -48 154

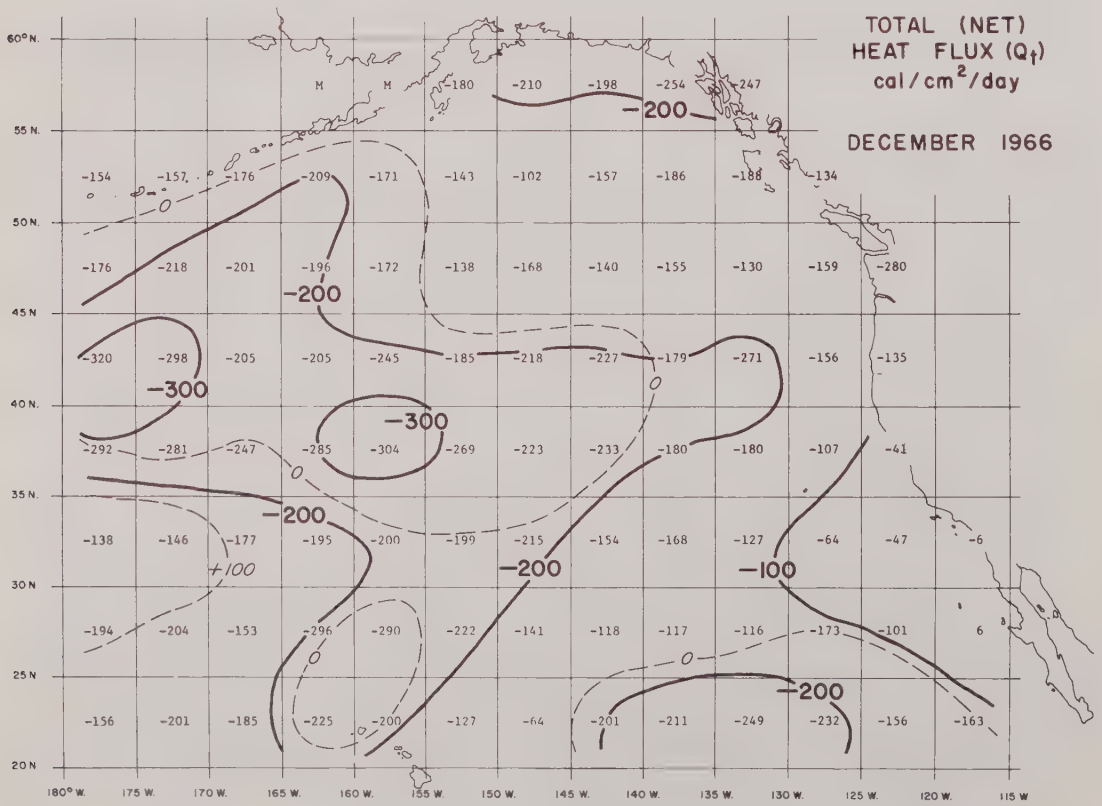

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2/day
JULY 1966
60°N
55 N
50 N
45 N
40 N
35 N
30 N
25 N
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+200
+200
+300
+200
+100
+300
+200
+100
0
-100
0
0
0
0
M 143 270 121 112 126 223
127 166 129 163 140 177 125 124 132 141 268
153 150 177 189 168 179 209 141 139 116 164 164
106 140 203 175 185 209 143 121 115 85 80 356
138 230 302 273 241 184 116 53 76 115 198 346
198 238 239 220 181 131 109 68 95 81 153 195 232
162 132 271 272 115 18 -21 35 47 75 3 70 226
148 82 81 79 72 98 154 11 55 -61 -31 -27 143

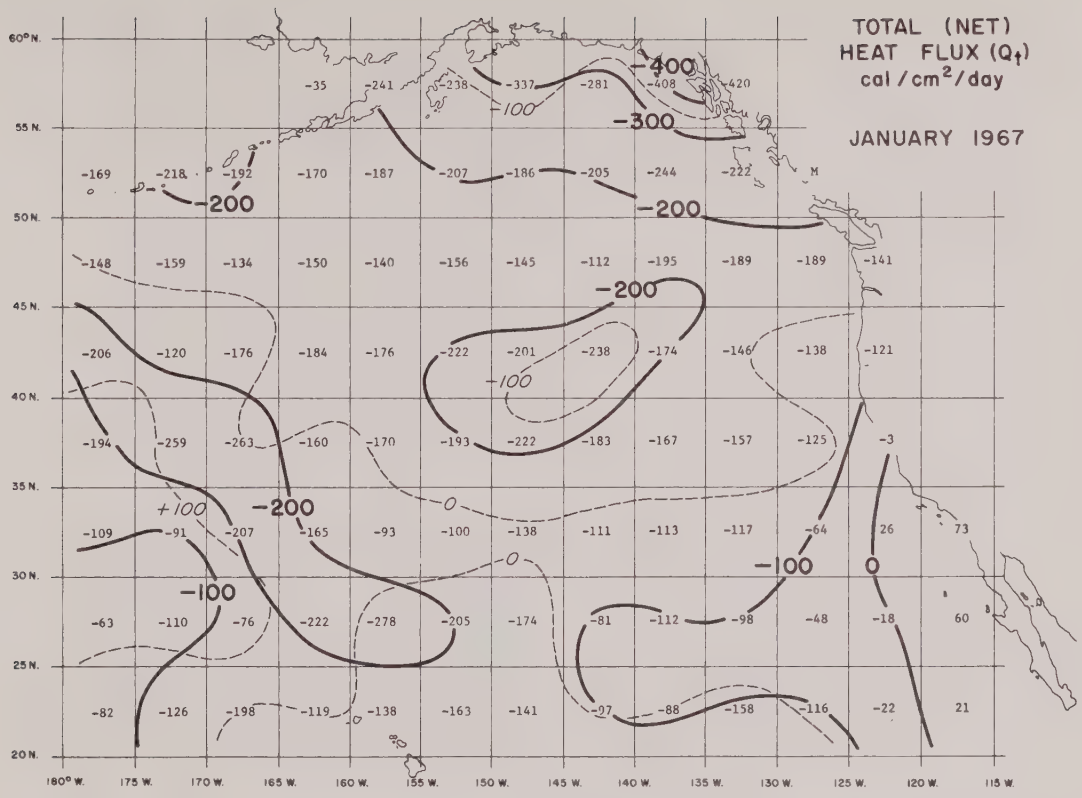

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2/day
AUGUST 1966
60°N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+100
+100
+300
+200
+100
+200
+200
+100
0
-100
0
0
0
0
66 146 130 34 35 12 -77
151 101 112 98 128 122 93 91 97 78 180
138 162 154 156 131 104 112 100 103 104 172 297
63 92 96 87 131 119 156 133 106 80 185 404
218 103 177 197 176 130 137 104 58 83 170 183
239 232 166 130 147 170 111 66 -7 9 67 122 177
163 80 88 125 108 69 2 -34 -19 -15 100 187 241
29 62 100 66 93 41 3 -13 -8 57 85 36 227

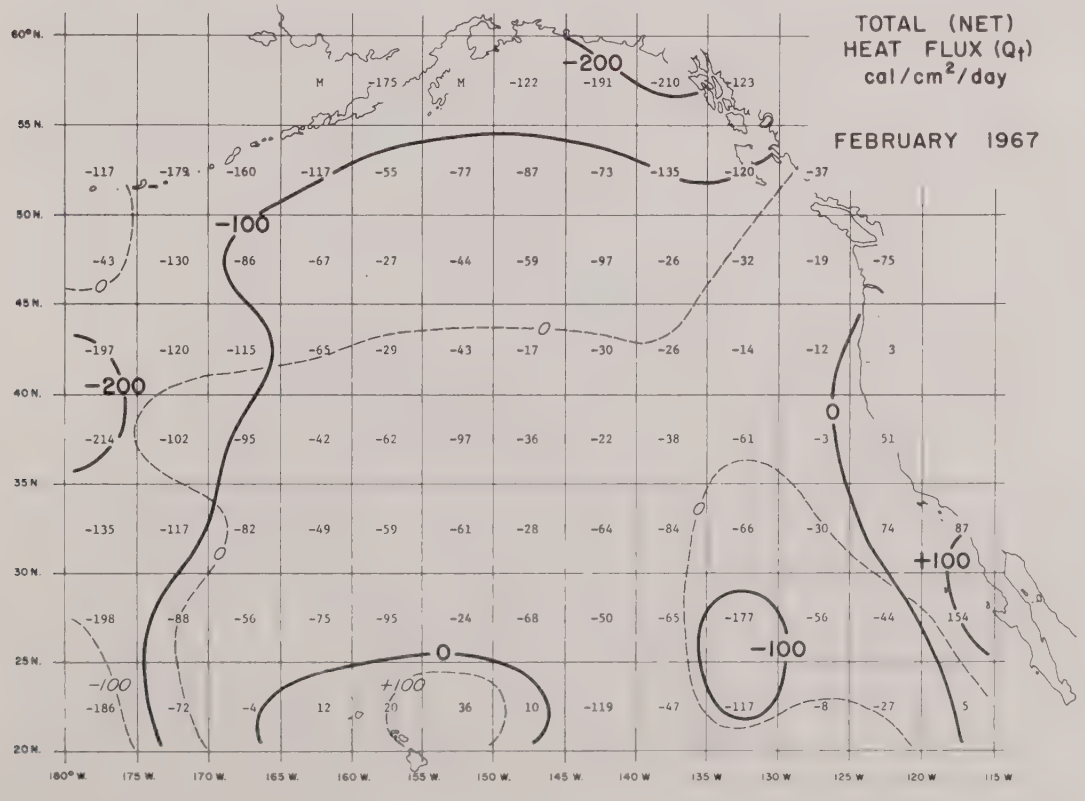

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
SEPTEMBER 1966
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-5 16 58 14 -33 -79 -83
70 37 30 45 23 -7 30 30 24 47 115
50 50 29 18 -8 9 -8 27 59 57 71 120
-19 -5 -15 -81 -36 -43 -92 -22 32 77 93 210
-151 -165 -264 -135 -113 -68 -5 28 65 86 171 245
-71 -60 18 -17 6 87 133 127 156 134 182 187 177
-23 93 132 223 84 101 144 142 120 121 103 68 238
138 142 121 54 30 103 62 70 76 7 27 117 71
0
-100
-200
+100
+200

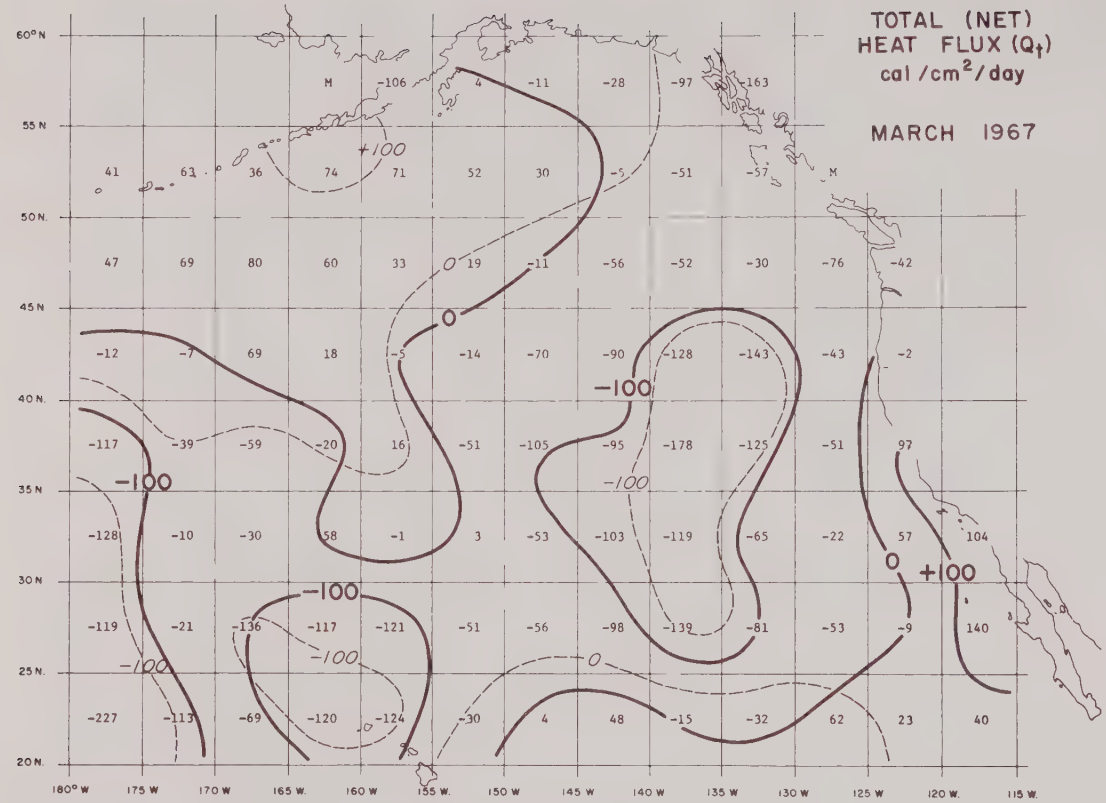

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
OCTOBER 1966
60° N.
55 N.
50 N.
45 N.
40 N.
35 N
30 N.
25 N
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W
-431 -218 -125 -264 -202 -359 -322
-106 -121 -153 -161 -172 -191 -151 -92 -120 -149 -40
-66 -77 -79 -87 -128 -84 -97 -57 -119 -162 -78 -42
-156 -70 -124 -108 -99 -77 -87 -63 -89 -104 -33 86
-242 -127 -34 -100 -56 -75 -57 -25 -22 -24 0 99
-119 -84 -80 -110 -119 -71 -27 -32 -54 -52 -72 90 149
-116 -138 -81 -108 -186 -69 -68 -14 -89 -113 -55 37 121
7 -6 -135 -28 4 -11 -54 -50 -121 -64 -33 55 39
0
-100
-200
+100

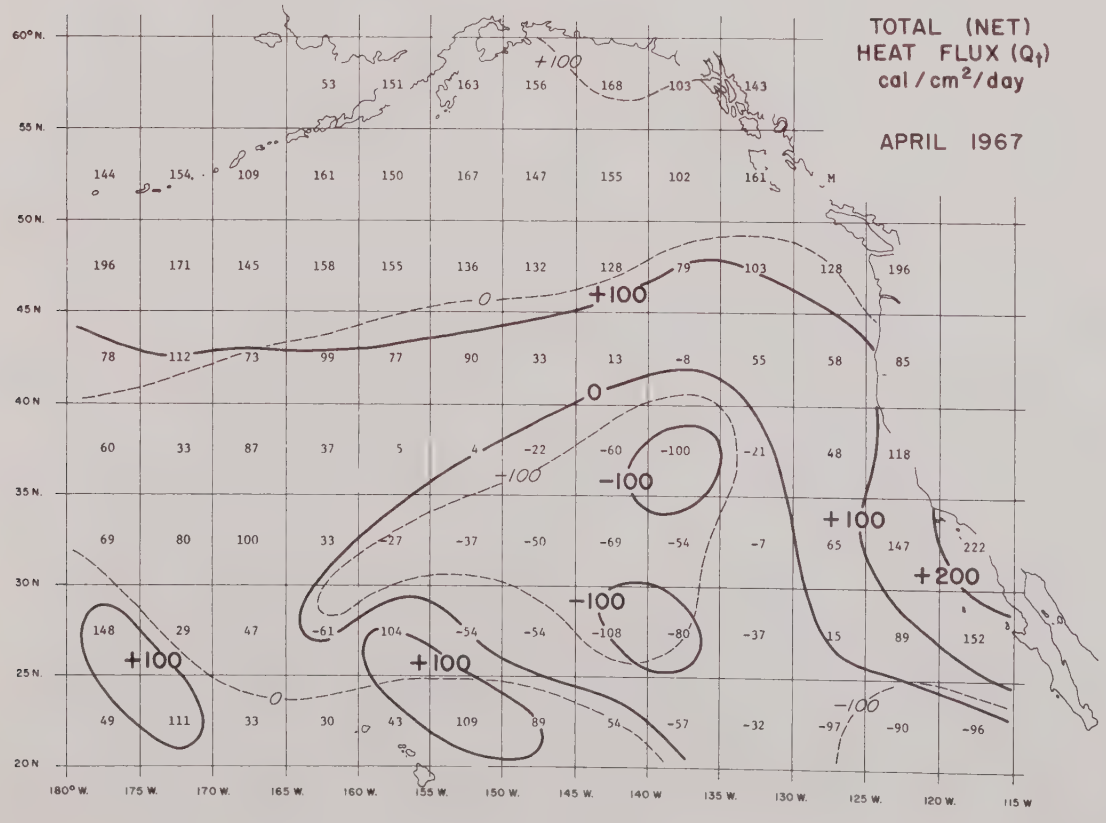

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
NOVEMBER 1966
60°N
55 N
50 N
45 N
40 N.
35 N
30 N
25 N
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-200
-100
-200
-300
-200
-100
-200
0
+100

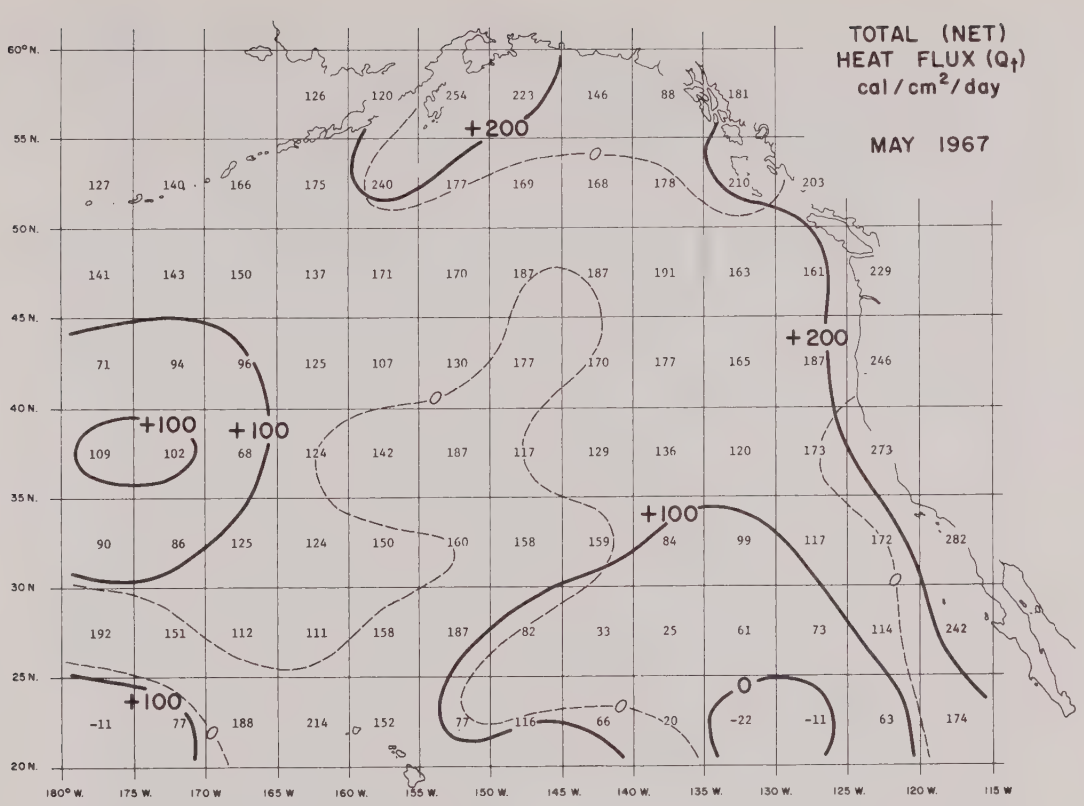

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
DECEMBER 1966
60°N.
55 N.
50 N.
45 N
40 N.
35 N.
30 N
25 N
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W
-200
-200
-300
-300
-200
-200
-100
-200
0
+100

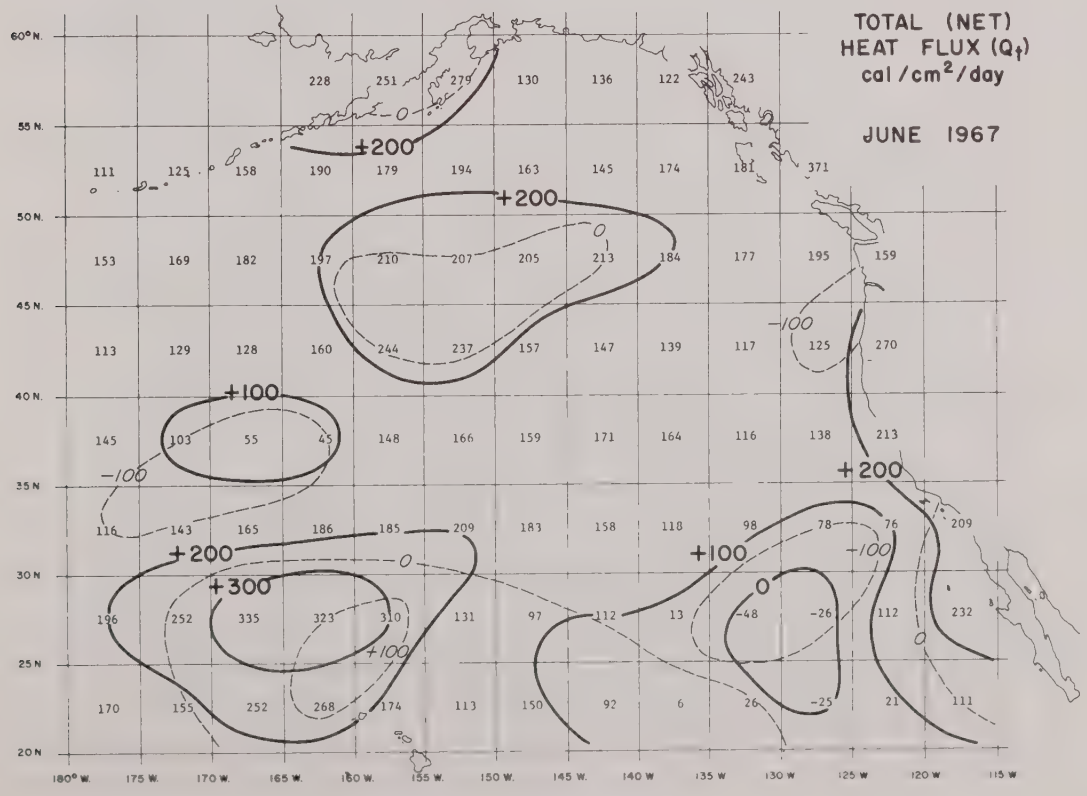

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JANUARY 1967
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-400
-300
-200
-100
0
+100
-35 -241 -238 -337 -281 -408 -420
-169 -218 -192 -170 -187 -207 -186 -205 -244 -222 M
-148 -159 -134 -150 -140 -156 -145 -112 -195 -189 -189 -141
-206 -120 -176 -184 -176 -222 -201 -238 -174 -146 -138 -121
-194 -259 -263 -160 -170 -193 -222 -183 -167 -157 -125 -3
-109 -91 -207 -165 -93 -100 -138 -111 -113 -117 -64 26 73
-63 -110 -76 -222 -278 -205 -174 -81 -112 -98 -48 -18 60
-82 -126 -198 -119 -138 -163 -141 -97 -88 -158 -116 -22 21

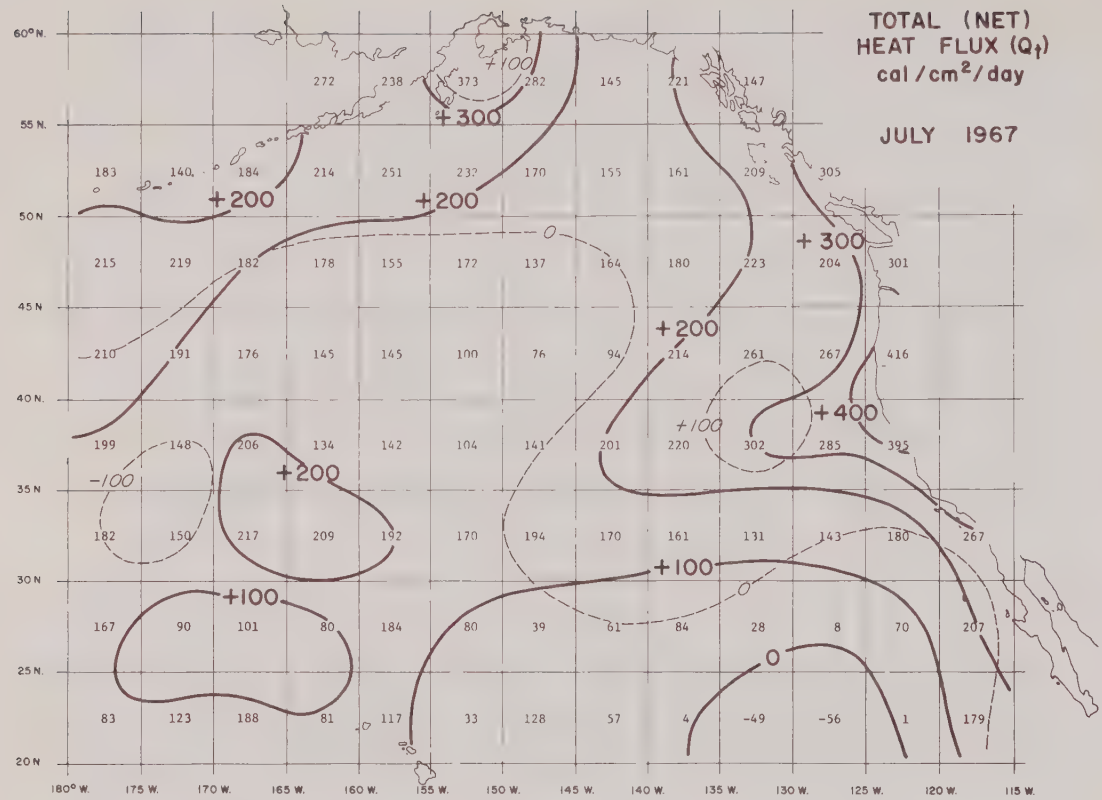

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
FEBRUARY 1967
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-200
-100
0
+100
M -175 M -122 -191 -210 -123
-117 -179 -160 -117 -55 -77 -87 -73 -135 -120 -37
-43 -130 -86 -67 -27 -44 -59 -97 -26 -32 -19 -75
-197 -120 -115 -65 -29 -43 -17 -30 -26 -14 -12 3
-214 -102 -95 -42 -62 -97 -36 -22 -38 -61 -3 51
-135 -117 -82 -49 -59 -61 -28 -64 -84 -66 -30 74 87
-198 -88 -56 -75 -95 -24 -68 -50 -65 -177 -56 -44 154
-186 -72 -4 12 20 36 10 -119 -47 -117 -8 -27 5

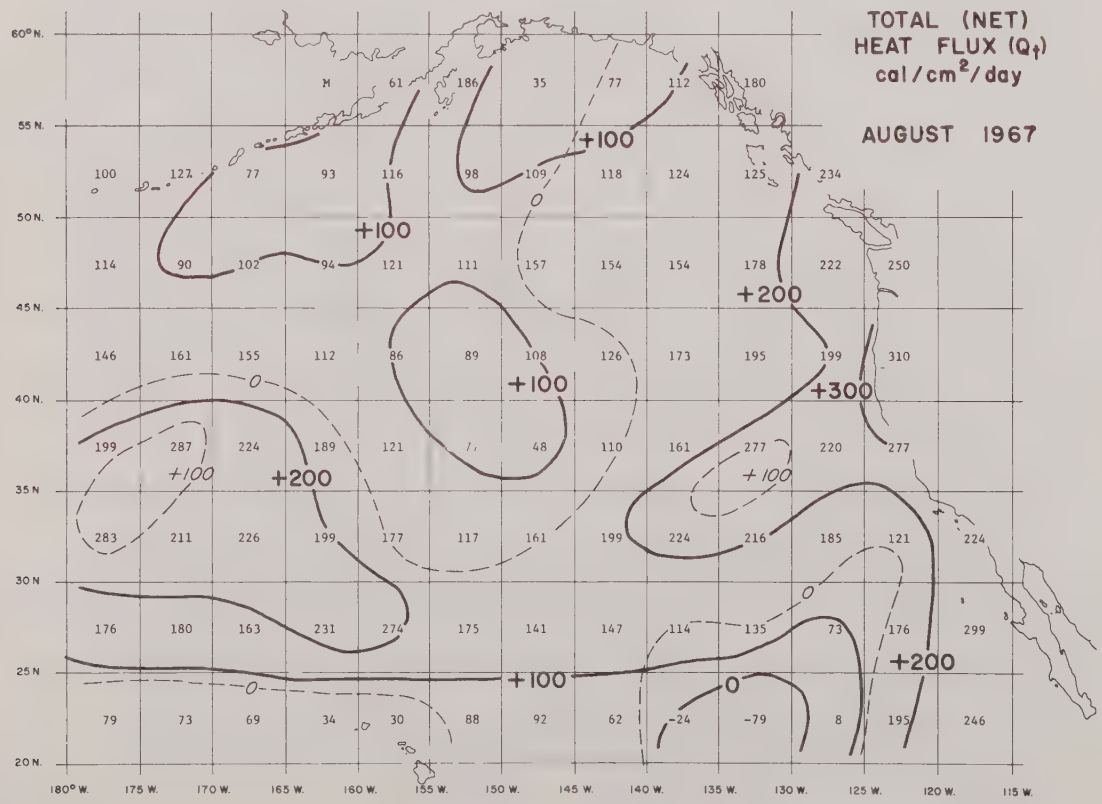

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
MARCH 1967
60° N
55 N
50 N.
45 N
40 N.
35 N
30 N
25 N.
20 N.
180° W
175 W
170 W
165 W.
160 W
155 W.
150 W
145 W
140 W
135 W
130 W
125 W
120 W.
115 W.
+100
0
-100

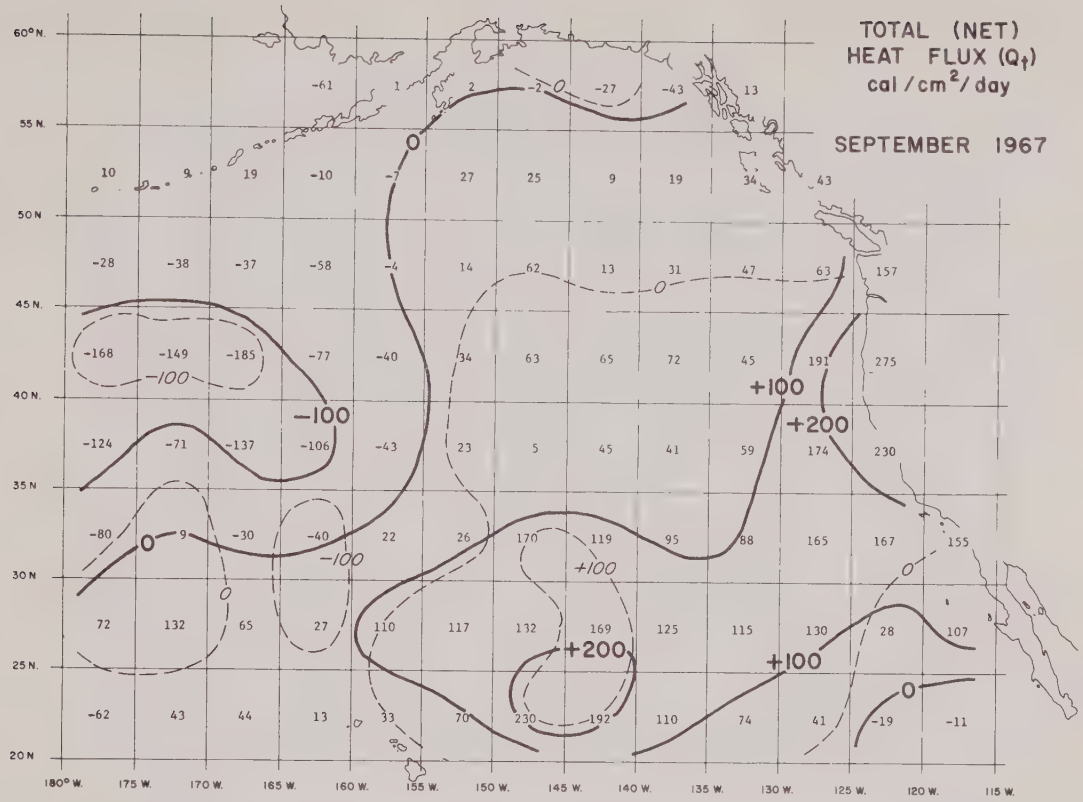

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
APRIL 1967
60° N.
55 N.
50 N.
45 N
40 N
35 N.
30 N
25 N.
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W
135 W.
130 W.
125 W.
120 W.
115 W
+100
0
-100
+200

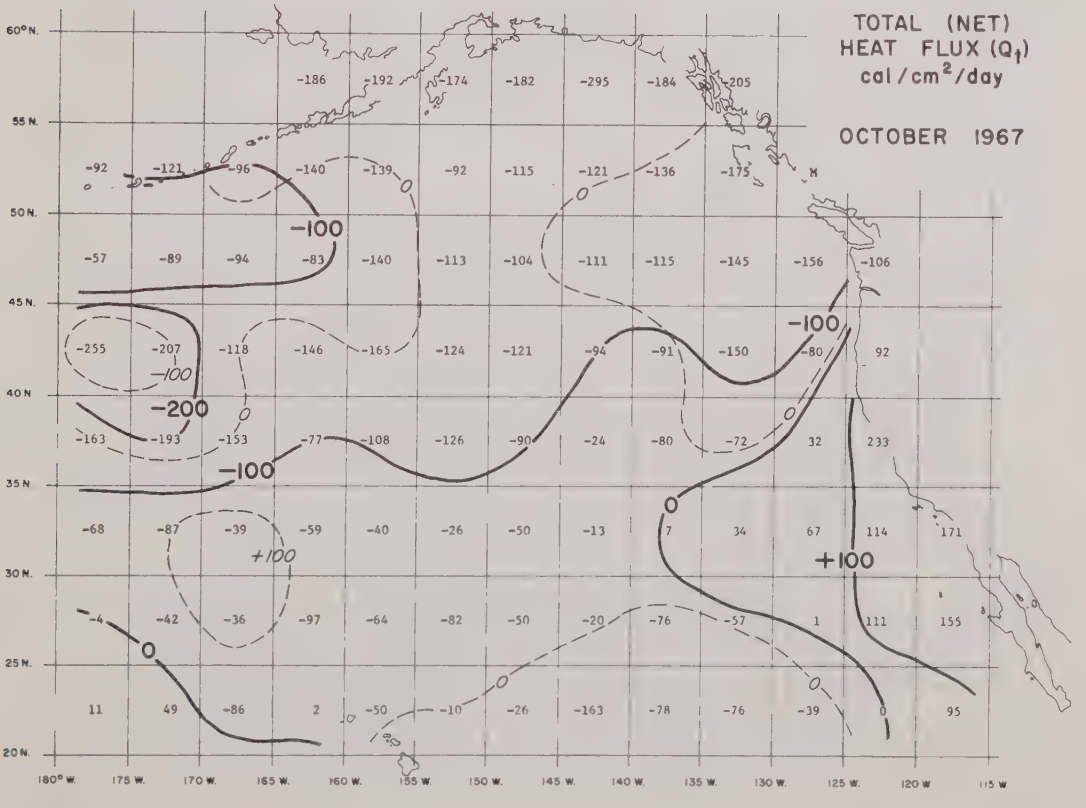

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
MAY 1967
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W
165 W
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W
+200
+100
0
126 120 254 223 146 88 181
127 140 166 175 240 177 169 168 178 210 203
141 143 150 137 171 170 187 187 191 163 161 229
71 94 96 125 107 130 177 170 177 165 187 246
109 102 68 124 142 187 117 129 136 120 173 273
90 86 125 124 150 160 158 159 84 99 117 172 282
192 151 112 111 158 187 82 33 25 61 73 114 242
-11 77 188 214 152 77 116 66 20 -22 -11 63 174

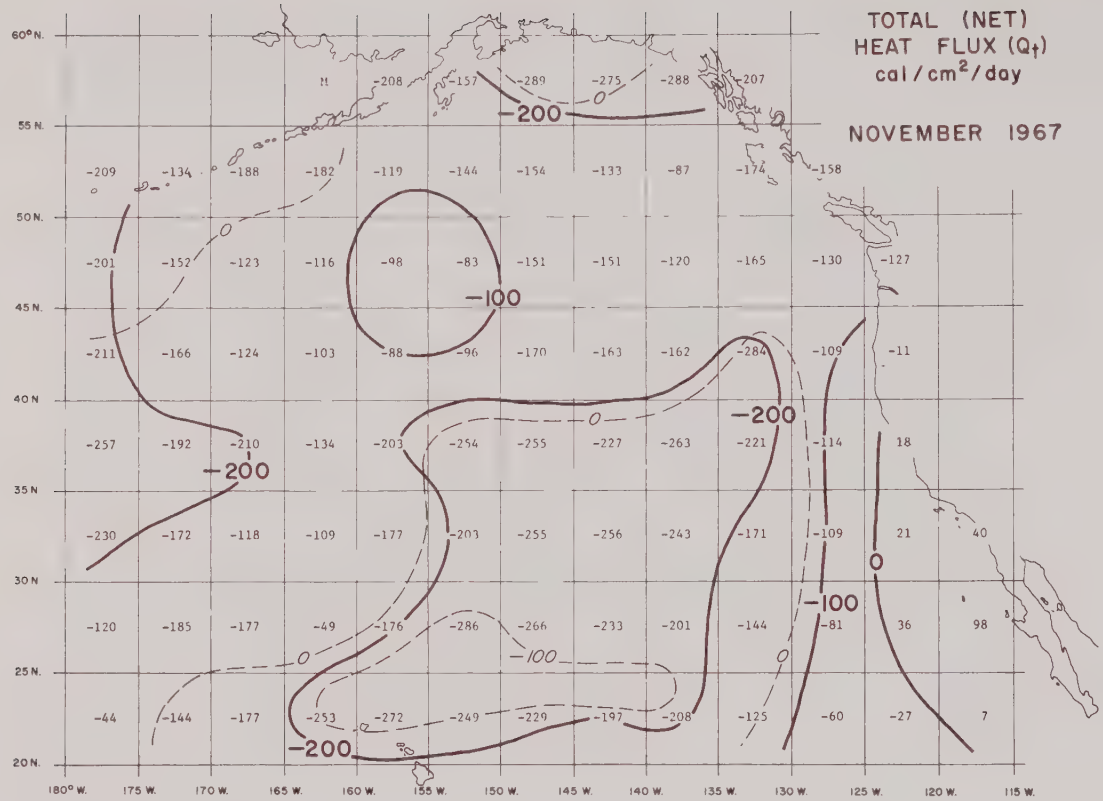

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JUNE 1967
60° N.
55 N.
50 N.
45 N.
40 N.
35 N
30 N
25 N
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W
135 W
130 W
125 W
120 W
115 W
+200
+100
+300
-100
0
228 251 279 130 136 122 243
111 125 158 190 179 194 163 145 174 181 371
153 169 182 197 210 207 205 213 184 177 195 159
113 129 128 160 244 237 157 147 139 117 125 270
145 103 55 45 148 166 159 171 164 116 138 213
116 143 165 186 185 209 183 158 118 98 78 76 209
196 252 335 323 310 131 97 112 13 -48 -26 112 232
170 155 252 268 174 113 150 92 6 26 -25 21 111

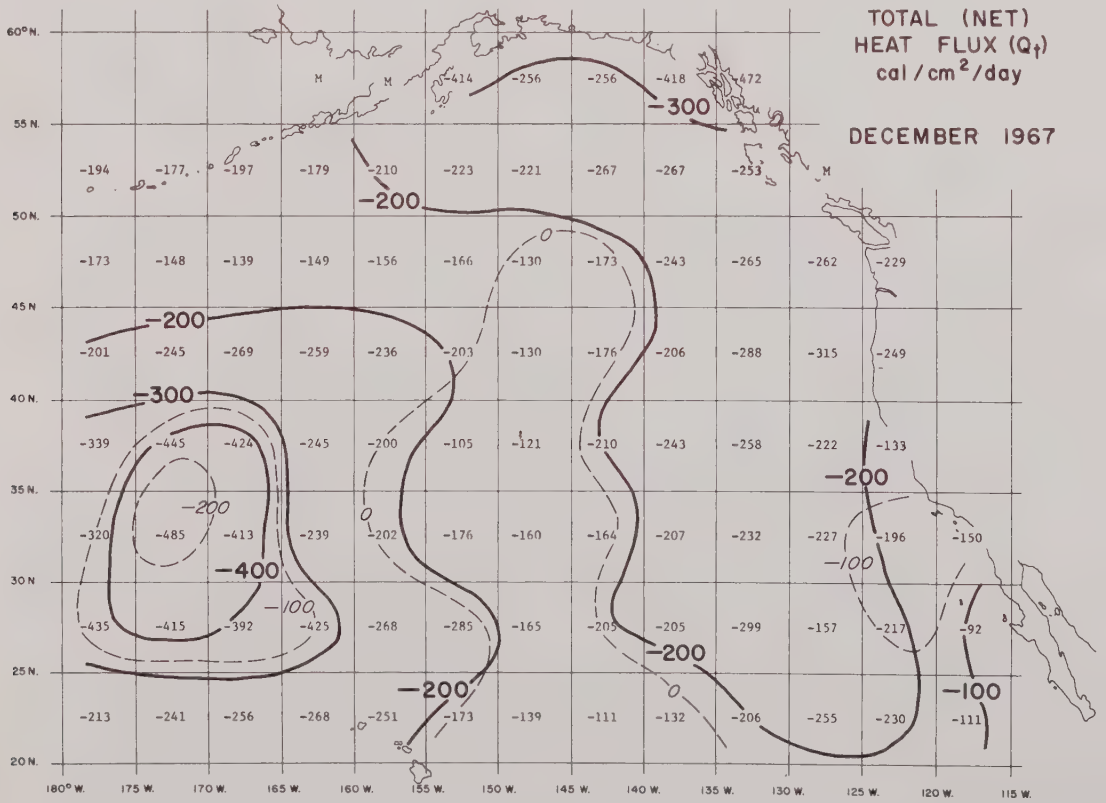

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JULY 1967
60° N.
55 N.
50 N
45 N
40 N.
35 N
30 N
25 N.
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+100
+300
+200
+200
+300
+200
+400
+100
-100
+200
+100
+100
0
0
272 238 373 282 145 221 147
183 140 184 214 251 232 170 155 161 209 305
215 219 182 178 155 172 137 164 180 223 204 301
210 191 176 145 145 100 76 94 214 261 267 416
199 148 206 134 142 104 141 201 220 302 285 395
182 150 217 209 192 170 194 170 161 131 143 180 267
167 90 101 80 184 80 39 61 84 28 8 70 207
83 123 188 81 117 33 128 57 4 -49 -56 1 179

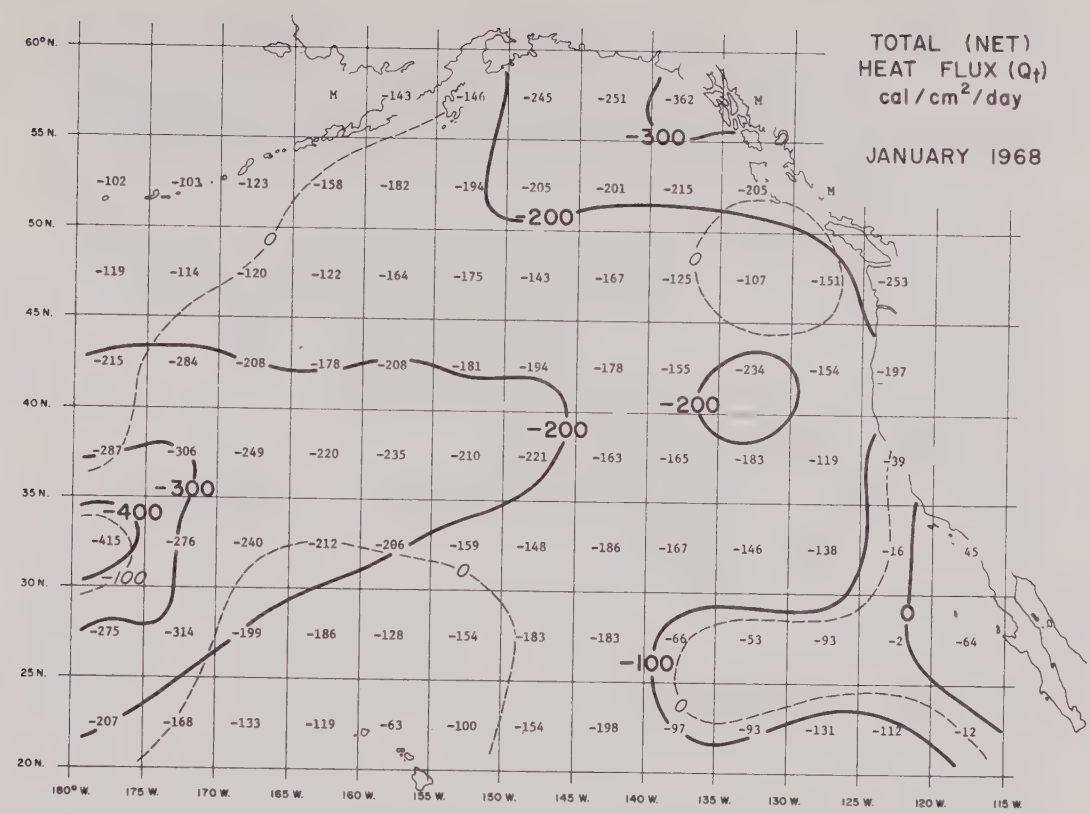

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
AUGUST 1967
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+100
+100
+100
+200
+300
+100
+200
+100
+100
0
0
0
0
M 61 186 35 77 112 180
100 127 77 93 116 98 109 118 124 125 234
114 90 102 94 121 111 157 154 154 178 222 250
146 161 155 112 86 89 108 126 173 195 199 310
199 287 224 189 121 71 48 110 161 277 220 277
283 211 226 199 177 117 161 199 224 216 185 121 224
176 180 163 231 274 175 141 147 114 135 73 176 299
79 73 69 34 30 88 92 62 -24 -79 8 195 246


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
SEPTEMBER 1967
60°N.
55 N.
50 N
45 N.
40 N.
35 N
30 N
25 N.
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-61 1 2 -2 -27 -43 13
10 19 -10 -7 27 25 9 19 34 43
-28 -38 -37 -58 -4 14 62 13 31 47 63 157
-168 -149 -185 -77 -40 34 63 65 72 45 191 275
-124 -71 -137 -106 -43 23 5 45 41 59 174 230
-80 9 -30 -40 22 26 170 119 95 88 165 167 155
72 132 65 27 110 117 132 169 125 115 130 28 107
-62 43 44 13 33 70 230 -192 110 74 41 -19 -11
0
-100
+100
+200


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
OCTOBER 1967
60°N.
55 N.
50N.
45 N.
40 N
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W
115 W
-186 -192 -174 -182 -295 -184 -205
-92 -121 -96 -140 -139 -92 -115 -121 -136 -175
-57 -89 -94 -83 -140 -113 -104 -111 -115 -145 -156 -106
-255 -207 -118 -146 -165 -124 -121 -94 -91 -150 -80 92
-163 -193 -153 -77 -108 -126 -90 -24 -80 -72 32 233
-68 -87 -39 -59 -40 -26 -50 -13 7 34 67 114 171
-4 -42 -36 -97 -64 -82 -50 -20 -76 -57 1 111 155
11 49 -86 2 -50 -10 -26 -163 -78 -76 -39 0 95
0
-100
-200
+100


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
NOVEMBER 1967
60°N.
55 N.
50 N.
45 N.
40 N
35 N
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-200
-100
0
-300


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
DECEMBER 1967
60°N.
55 N.
50 N.
45 N
40 N.
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-200
-100
0
-300
-400


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JANUARY 1968
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-300
-200
-200
-200
-300
-400
-100
-100
0
0
0
M
-143 -146 -245 -251 -362
-102 -103 -123 -158 -182 -194 -205 -201 -215 -205
-119 -114 -120 -122 -164 -175 -143 -167 -125 -107 -151 -253
-215 -284 -208 -178 -208 -181 -194 -178 -155 -234 -154 -197
-287 -306 -249 -220 -235 -210 -221 -163 -165 -183 -119 -39
-415 -276 -240 -212 -206 -159 -148 -186 -167 -146 -138 -16 45
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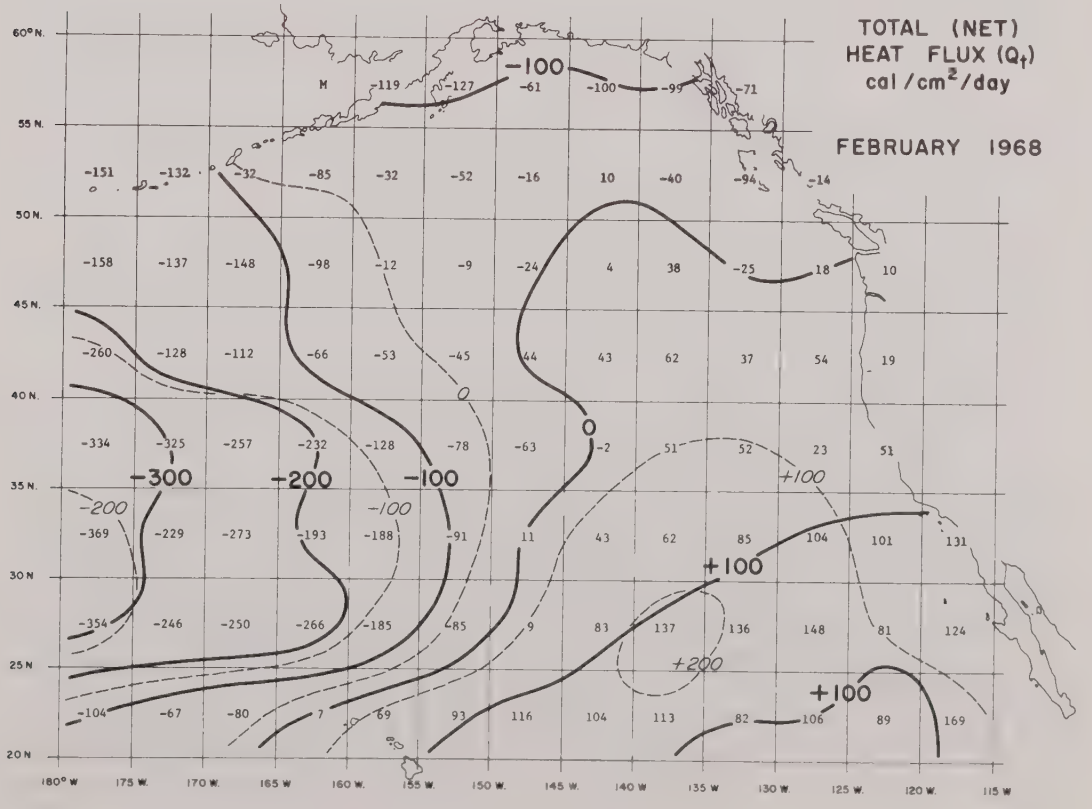
TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
FEBRUARY 1968
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N
20 N
180° W
175 W.
170 W.
165 W
160 W.
155 W.
150 W.
145 W.
140 W
135 W
130 W.
125 W.
120 W.
115 W
-100
-300
-200
-100
-200
-100
0
0
+100
+100
+200
+100
M
-119 -127 -61 -100 -99 -71
-151 -132 -32 -85 -32 -52 -16 10 -40 -94 -14
-158 -137 -148 -98 -12 -9 -24 4 38 -25 18 10
-260 -128 -112 -66 -53 -45 44 43 62 37 54 19
-334 -325 -257 -232 -128 -78 -63 -2 51 52 23 51
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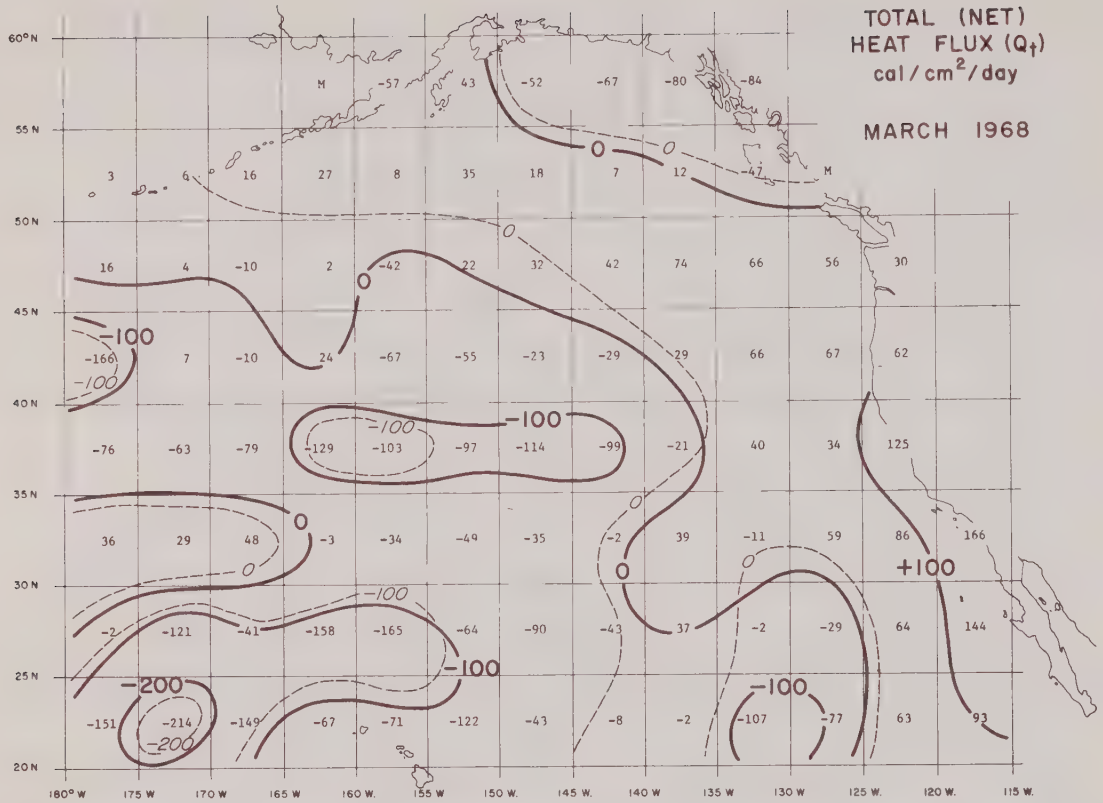
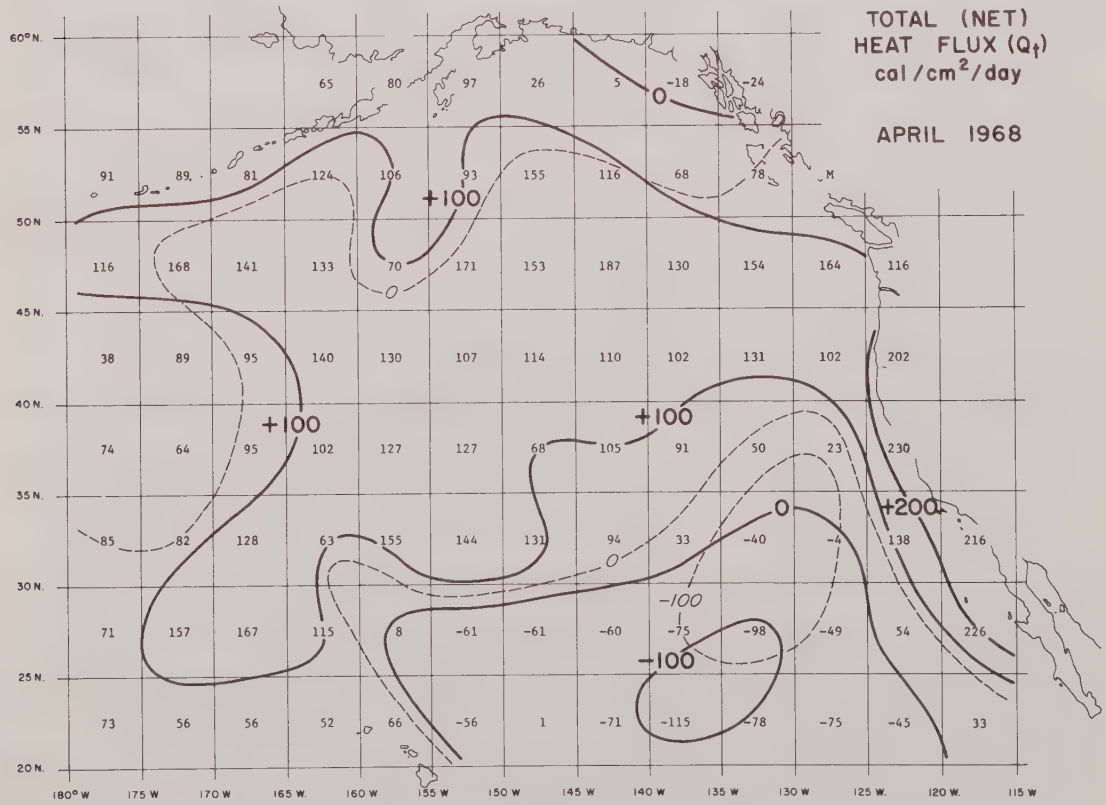
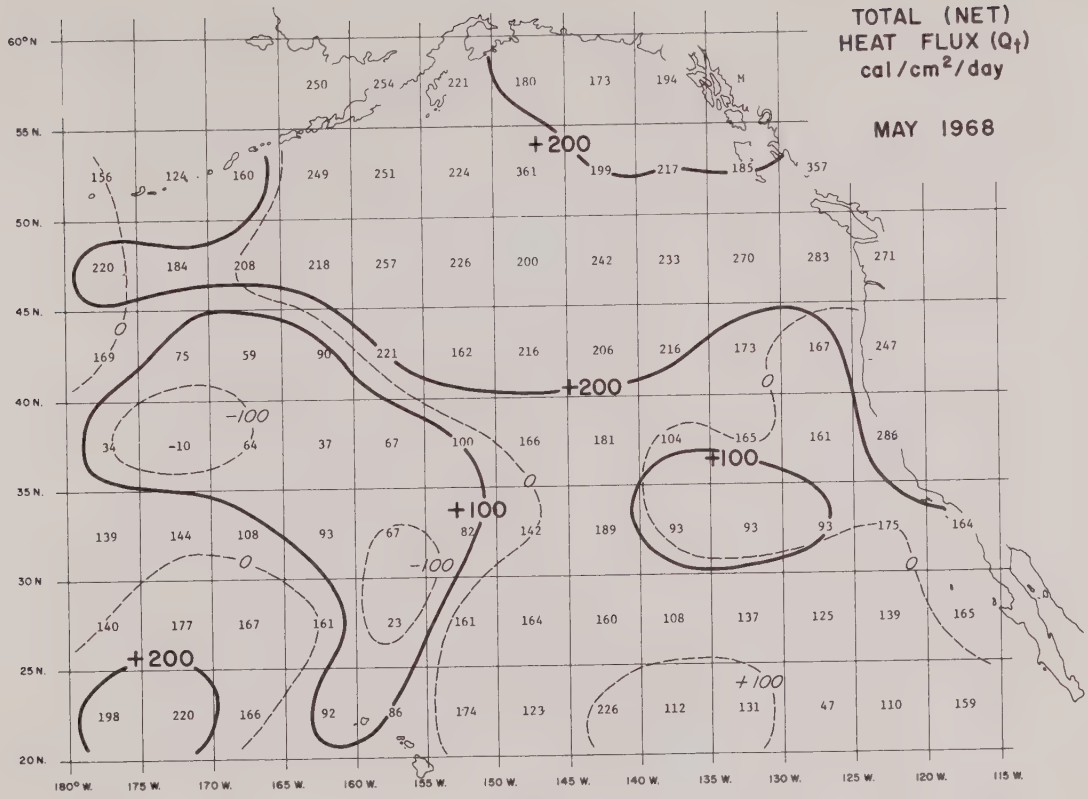
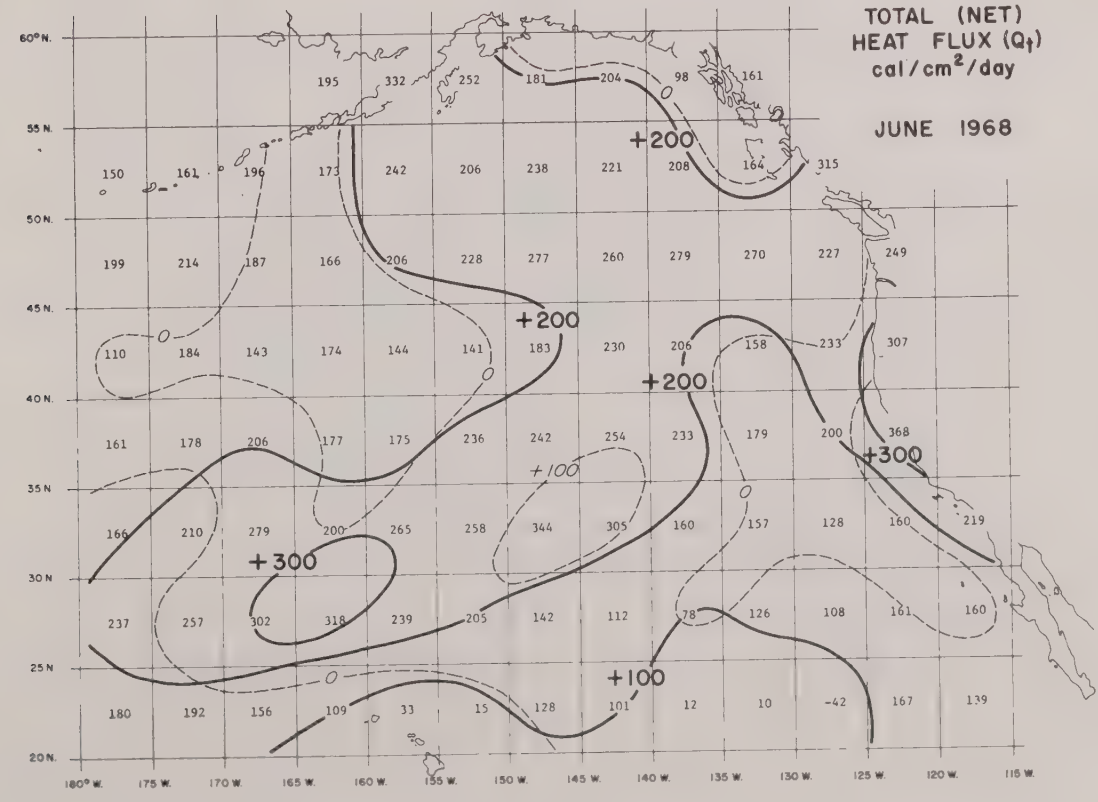
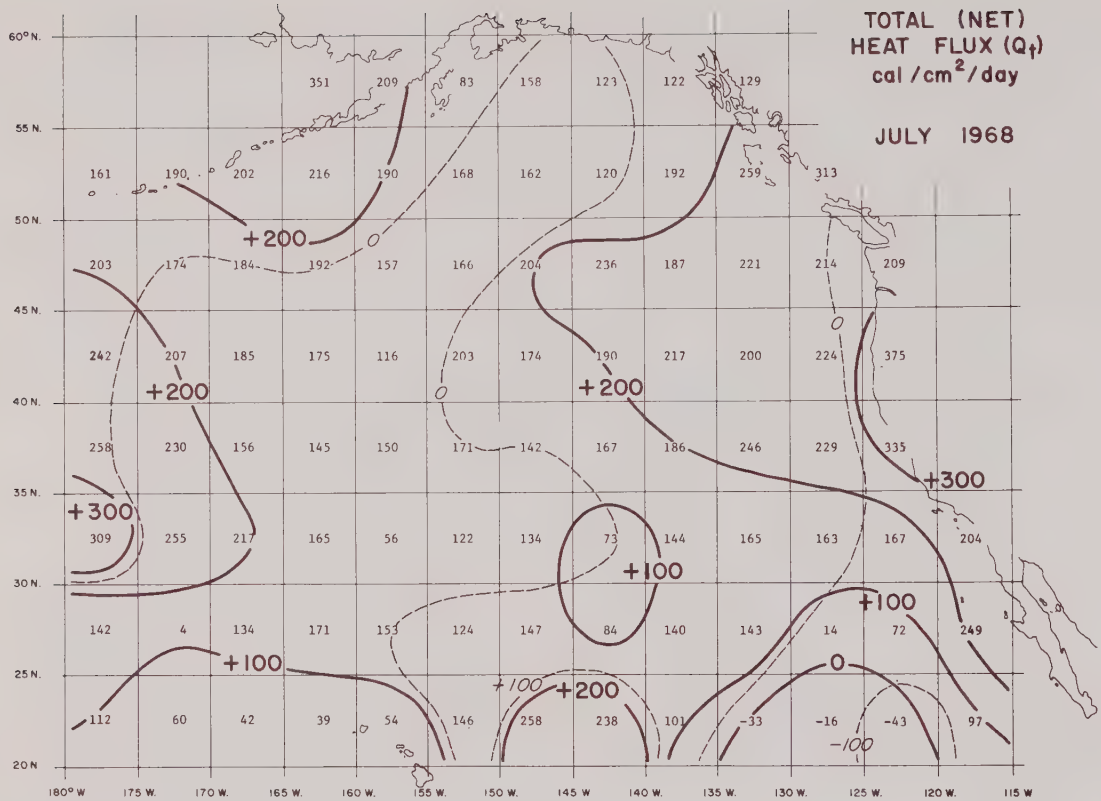
-104 -67 -80 7 69 93 116 104 113 82 106 89 169

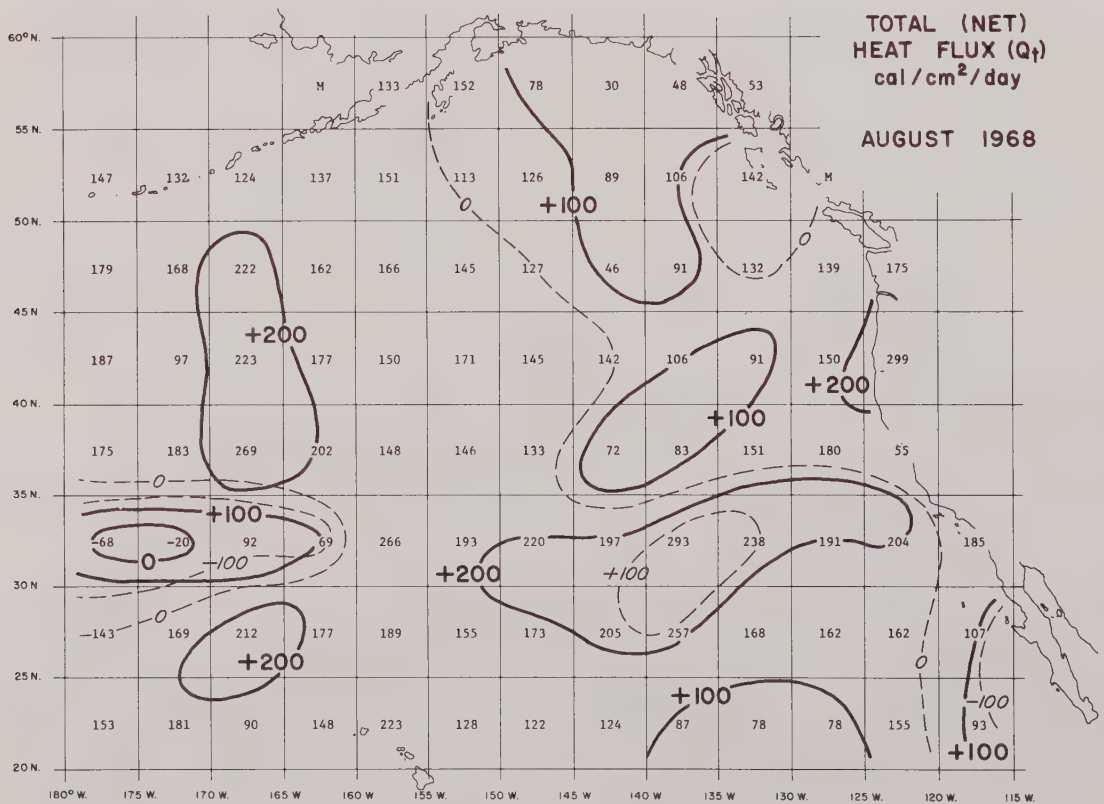

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
MARCH 1968
60° N
55 N
50 N
45 N
40 N
35 N
30 N
25 N
20 N
180° W
175 W
170 W
165 W
160 W.
155 W
150 W.
145 W.
140 W
135 W
130 W
125 W.
120 W.
115 W.

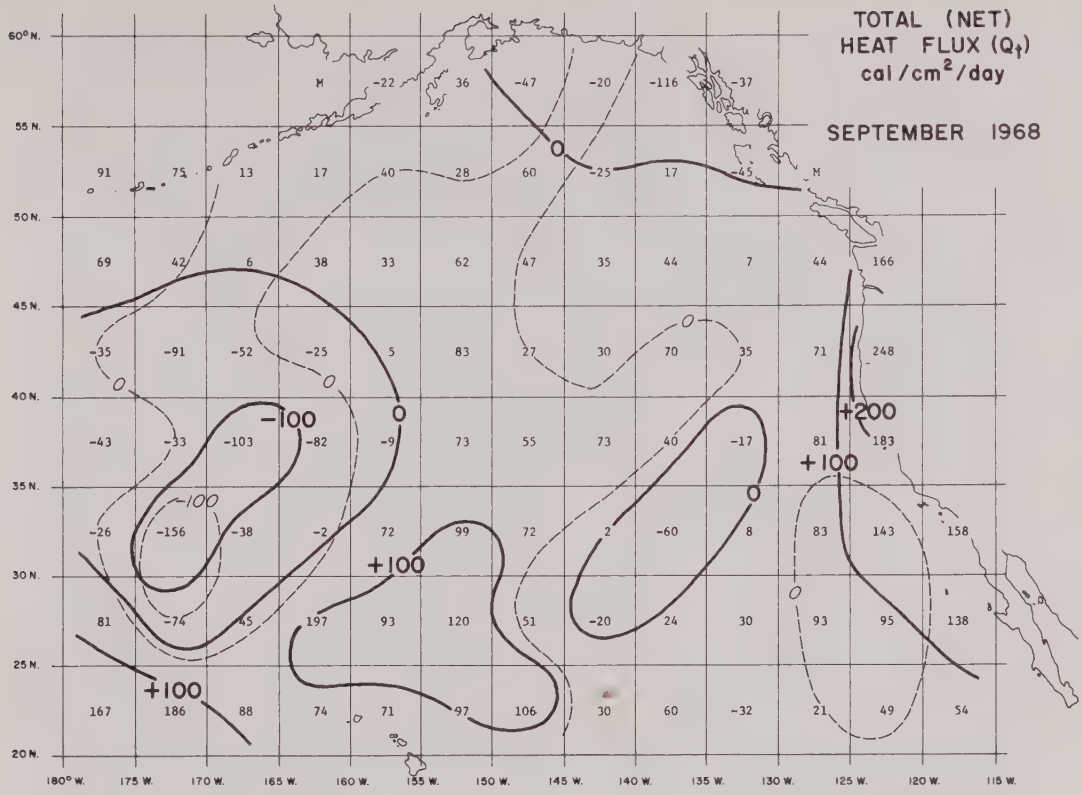

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
APRIL 1968
60° N.
55 N
50 N
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W
175 W
170 W
165 W.
160 W
155 W
150 W
145 W
140 W
135 W
130 W
125 W.
120 W.
115 W

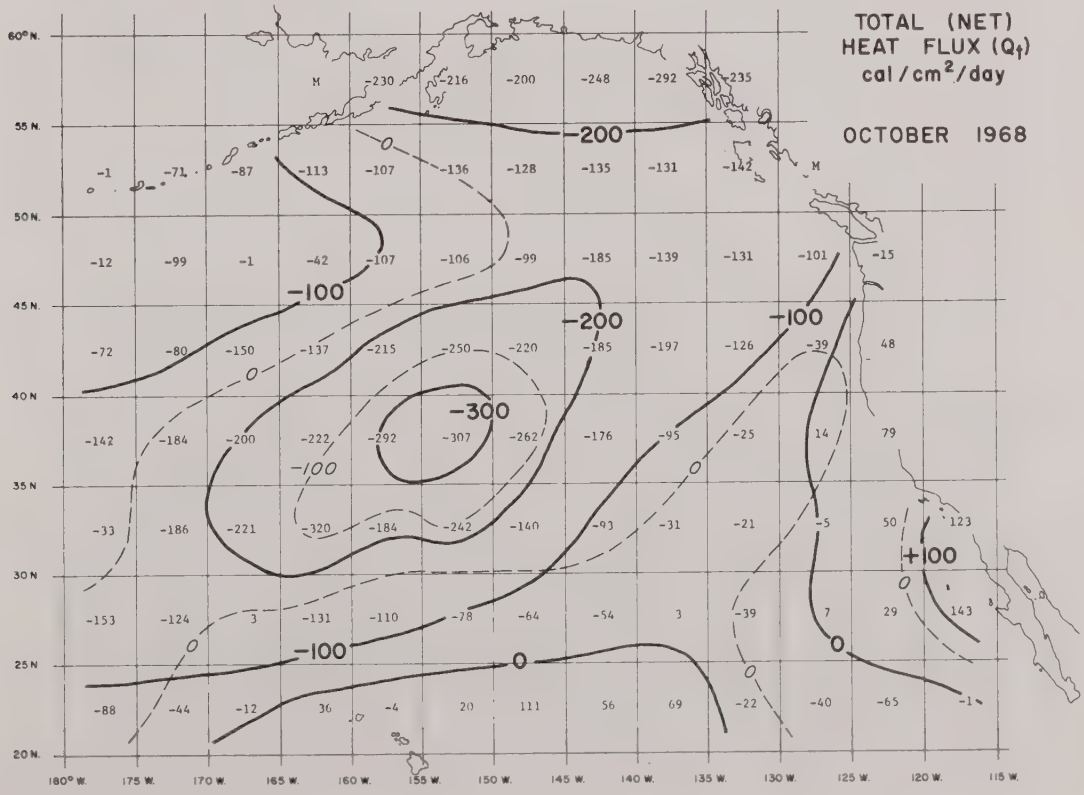

TOTAL (NET)
HEAT FLUX (Q_t)
cal/cm²/day
MAY 1968
60°N
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+200
+100
-100
0


TOTAL (NET)
HEAT FLUX (Q_t)
cal/cm²/day
JUNE 1968
60°N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+200
+300
+100
0


TOTAL (NET)
HEAT FLUX (Qt)
cal / cm² / day
JULY 1968
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N
180° W
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W
140 W.
135 W.
130 W.
125 W.
120 W.
115 W
+200
+300
+100
0
-100


TOTAL (NET)
HEAT FLUX (Qt)
cal / cm² / day
AUGUST 1968
60° N.
55 N.
50 N.
45 N
40 N.
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W
160 W
155 W.
150 W.
145 W
140 W
135 W
130 W.
125 W.
120 W.
115 W.
+200
+100
0
-100


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
SEPTEMBER 1968
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
M -22 36 -47 -20 -116 -37
91 75 13 17 40 28 60 -25 17 -45 M
69 42 6 38 33 62 47 35 44 7 44 166
-35 -91 -52 -25 5 83 27 30 70 35 71 248
-43 -33 -103 -82 -9 73 55 73 40 -17 81 183
-26 -156 -38 -2 72 99 72 2 -60 8 83 143 158
81 -74 45 197 93 120 51 -20 24 30 93 95 138
167 186 88 74 71 97 106 30 60 -32 21 49 54
-100
+100
+200
+100
0


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
OCTOBER 1968
60° N.
55 N.
50 N.
45 N.
40 N
35 N
30 N
25 N
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
M -230 -216 -200 -248 -292 -235
-1 -71 -87 -113 -107 -136 -128 -135 -131 -142 M
-12 -99 -1 -42 -107 -106 -99 -185 -139 -131 -101 -15
-72 -80 -150 -137 -215 -250 -220 -185 -197 -126 -39 48
-142 -184 -200 -222 -292 -307 -262 -176 -95 -25 14 79
-33 -186 -221 -320 -184 -242 -140 -93 -31 -21 -5 50 123
-153 -124 3 -131 -110 -78 -64 -54 3 -39 7 29 143
-88 -44 -12 36 -4 20 111 56 69 -22 -40 -65 -1
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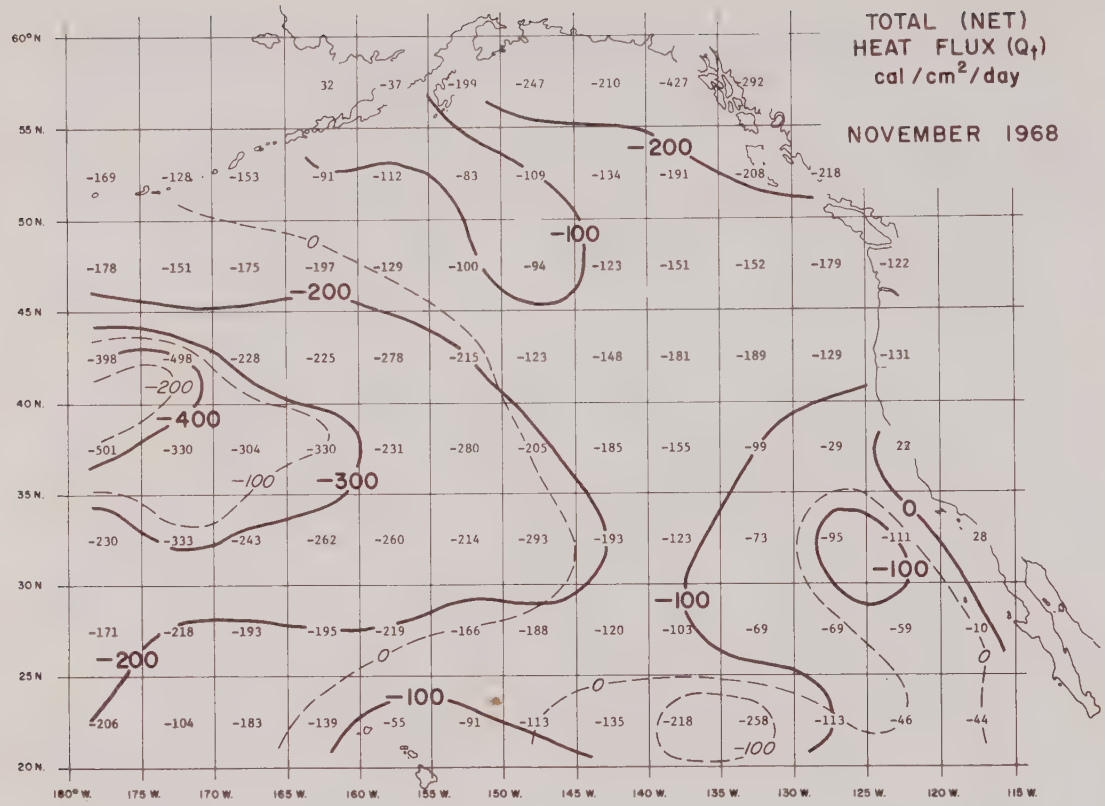
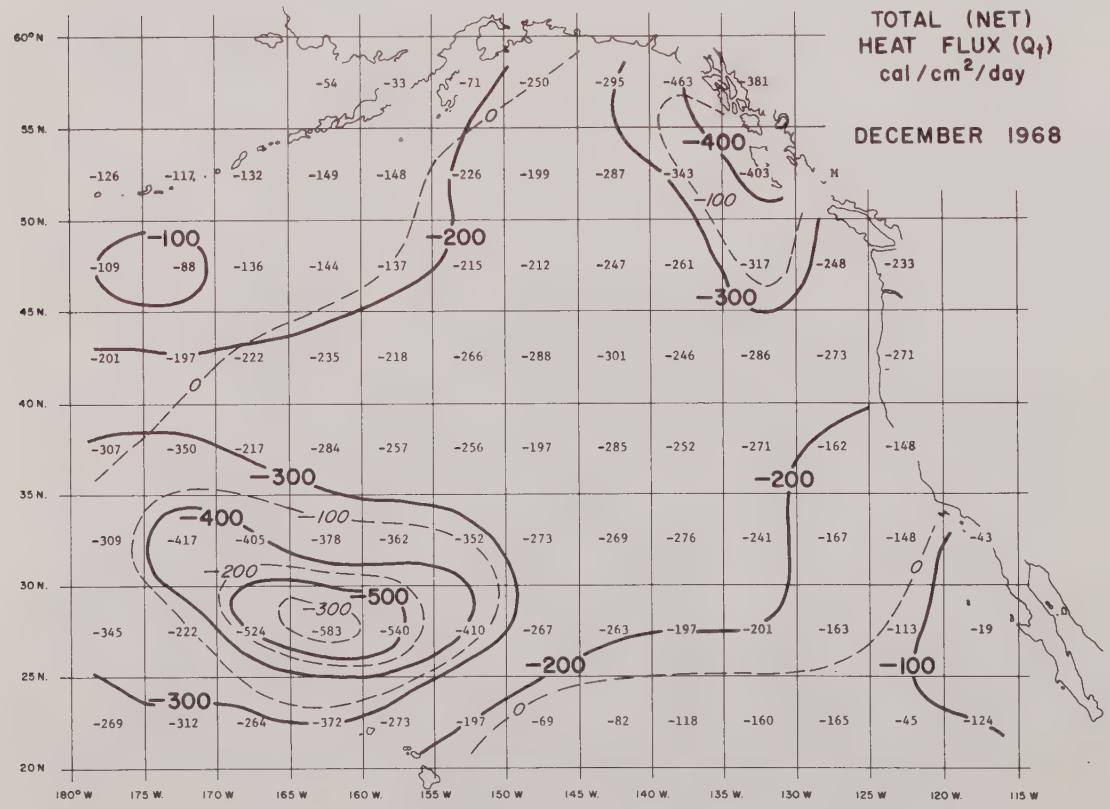
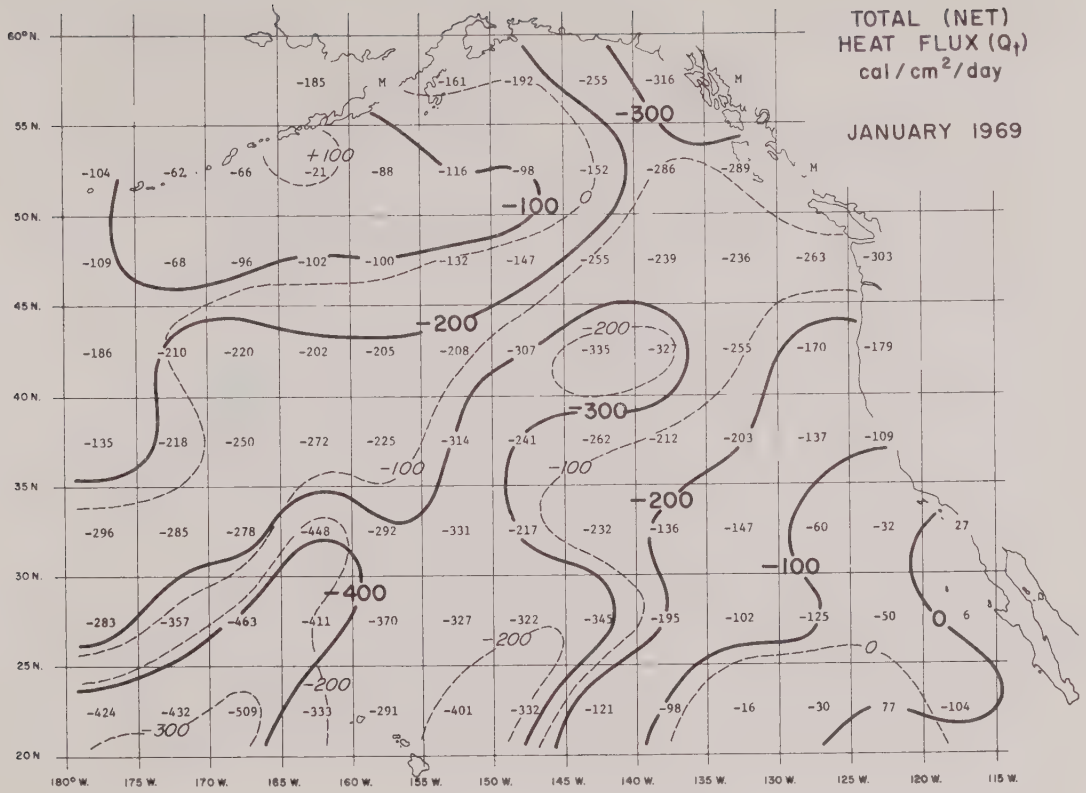
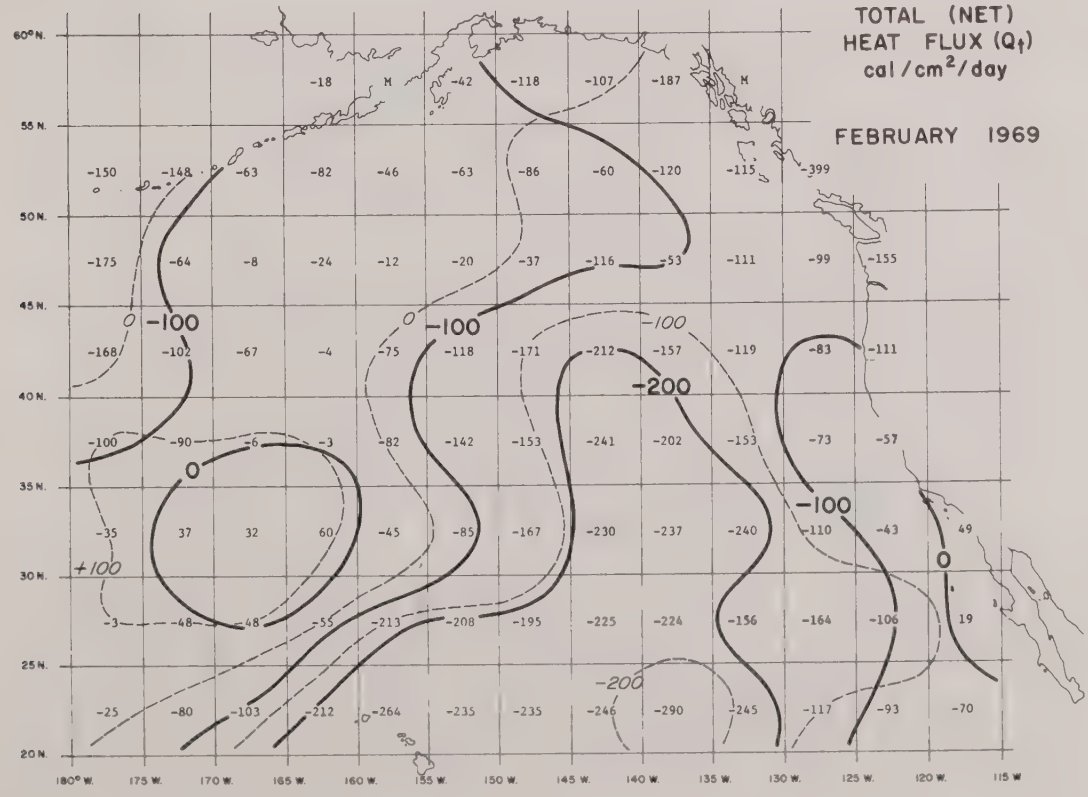
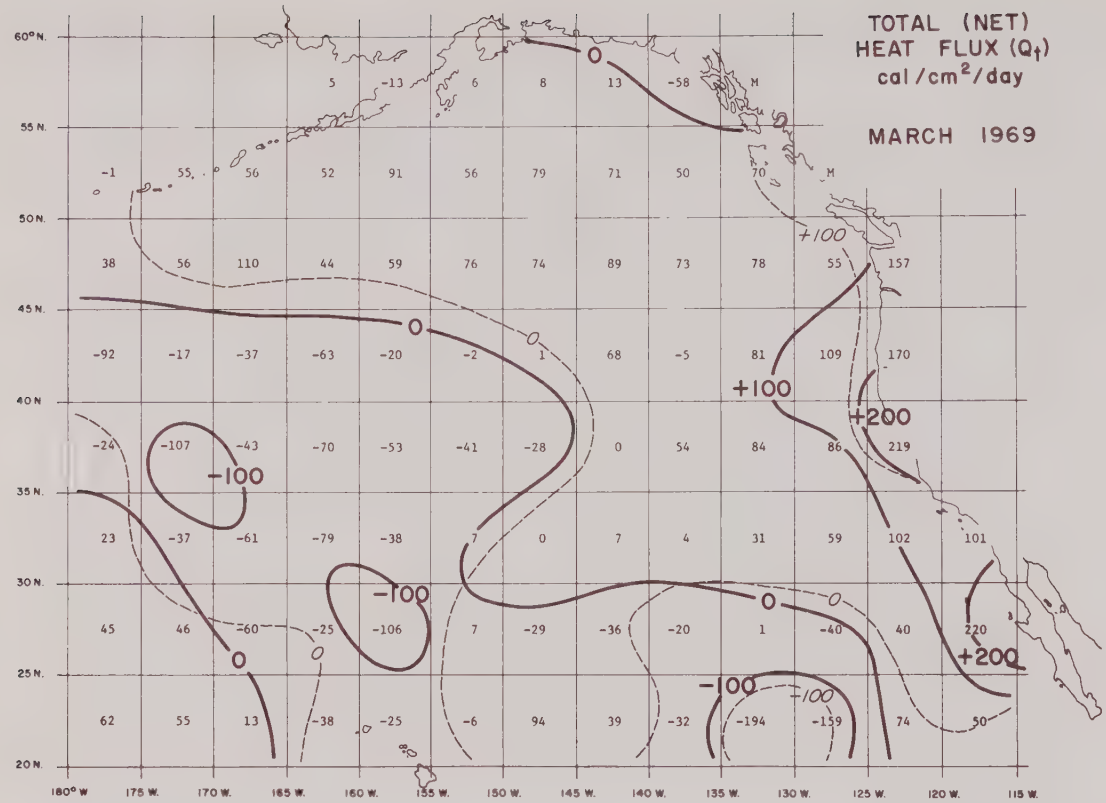
-100
-200
-100
-300
-100
+100
0

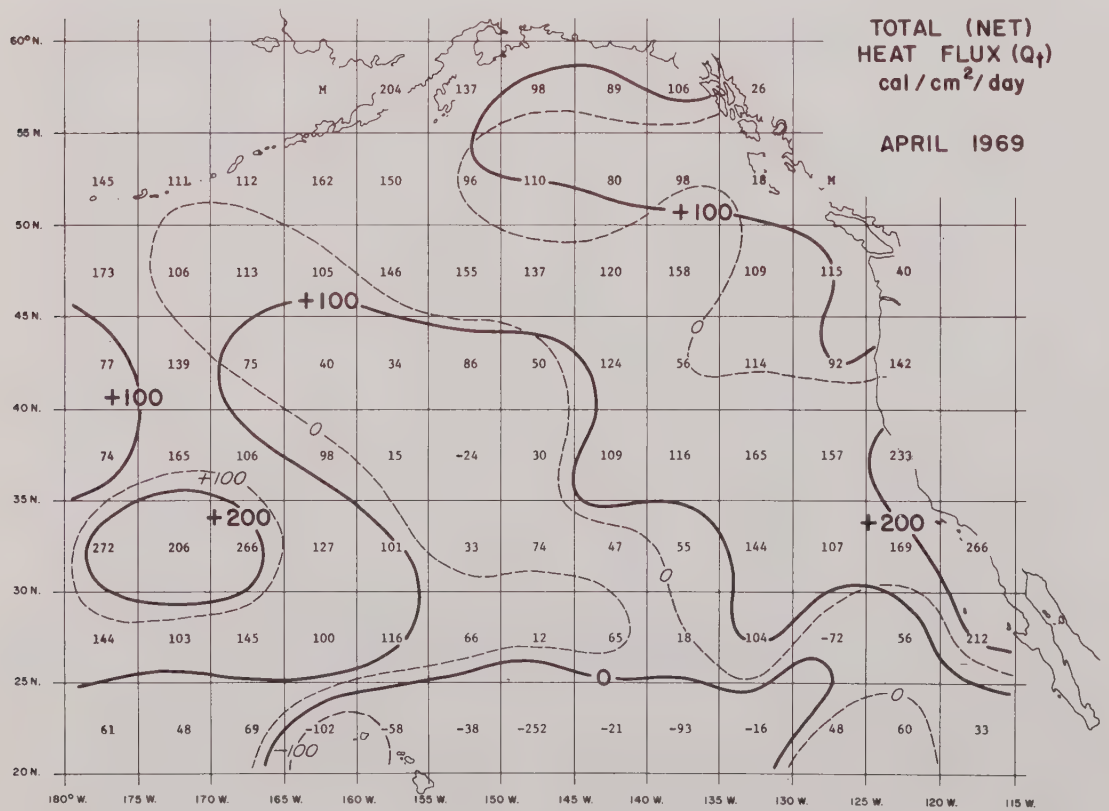

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
NOVEMBER 1968
60° N
55 N.
50 N.
45 N
40 N.
35 N.
30 N
25 N
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W
-200
-100
0
-400
-300

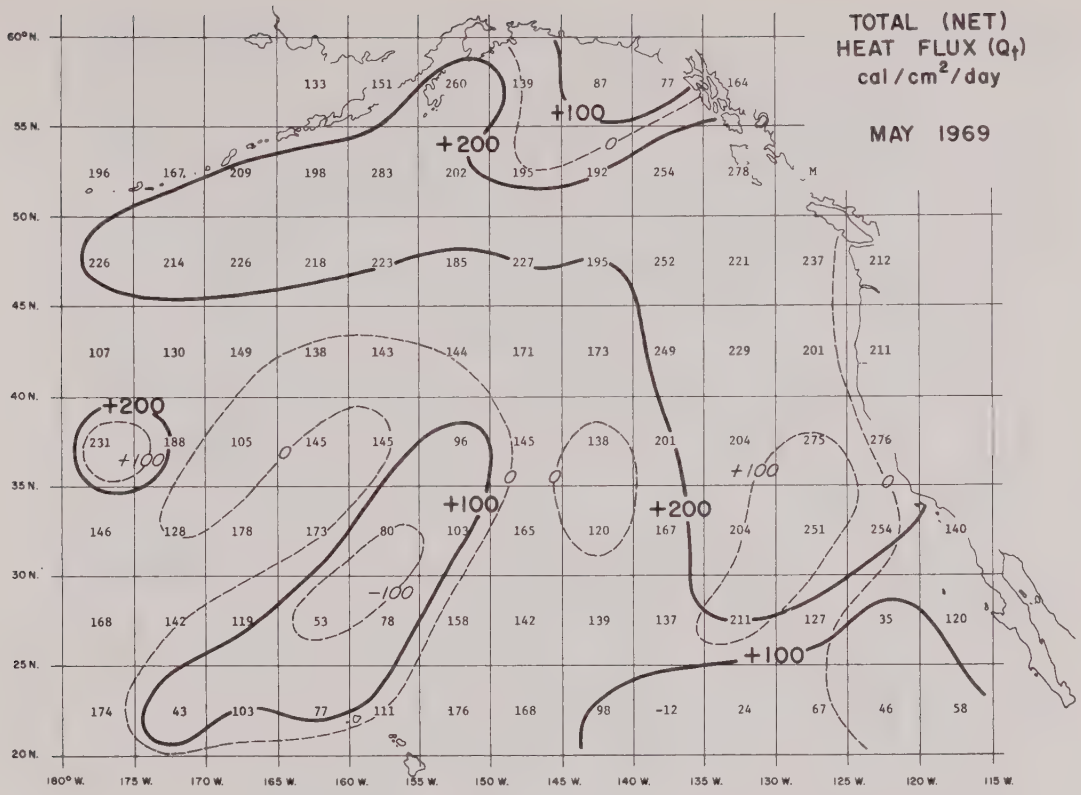

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
DECEMBER 1968
60° N
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N
180° W
175 W.
170 W
165 W
160 W.
155 W
150 W
145 W.
140 W.
135 W.
130 W
125 W
120 W.
115 W
-400
-200
-100
0
-300
-500

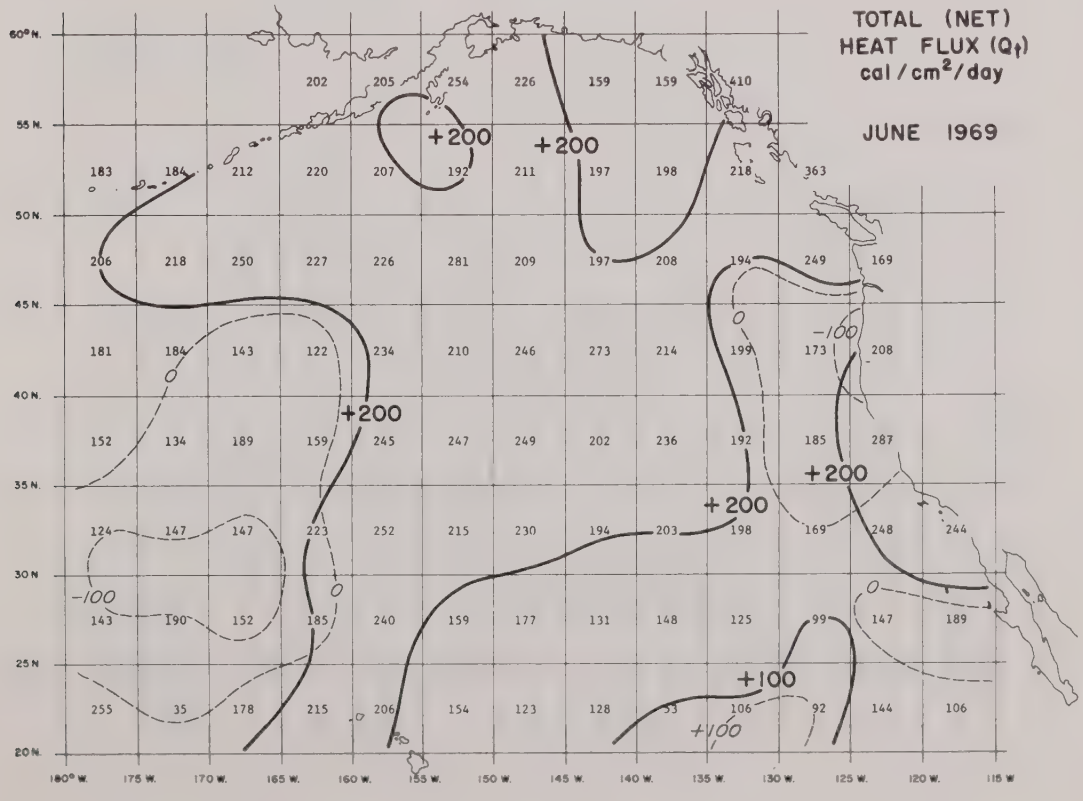

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JANUARY 1969
60°N.
55 N.
50N.
45 N.
40 N.
35 N
30 N.
25 N.
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-300
-200
-100
0
+100
-400

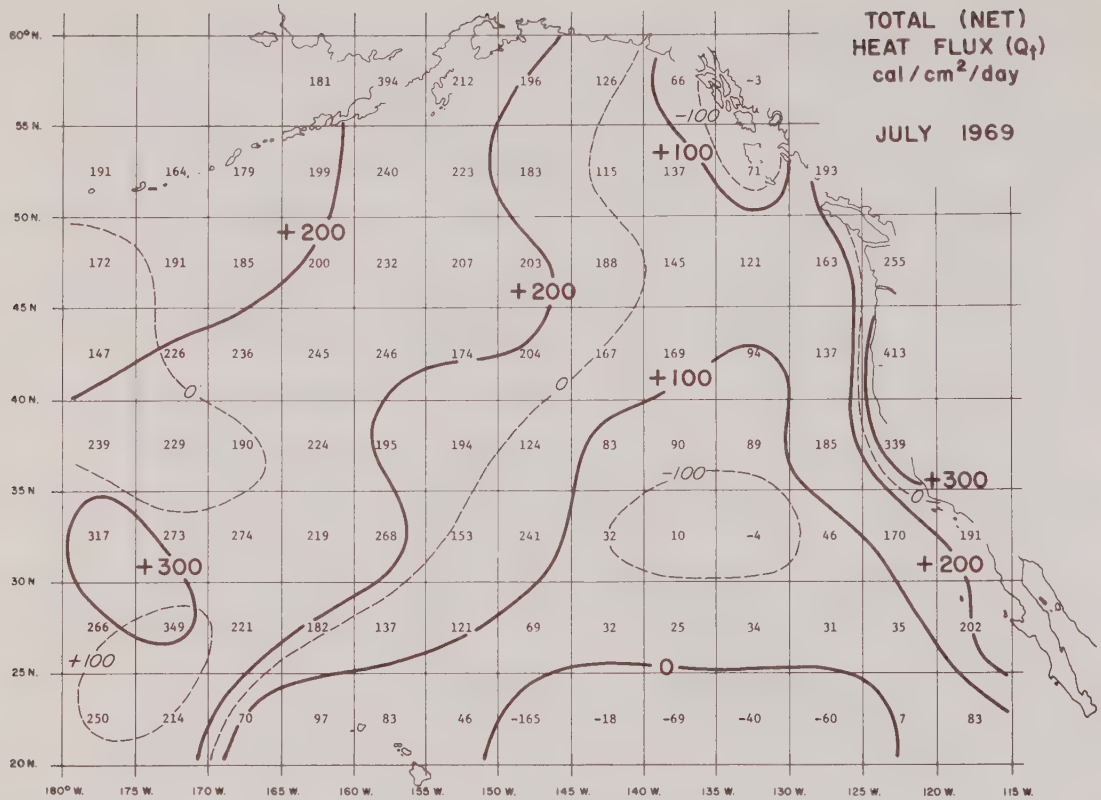

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
FEBRUARY 1969
60°N.
55 N.
50N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W
-200
-100
0
+100

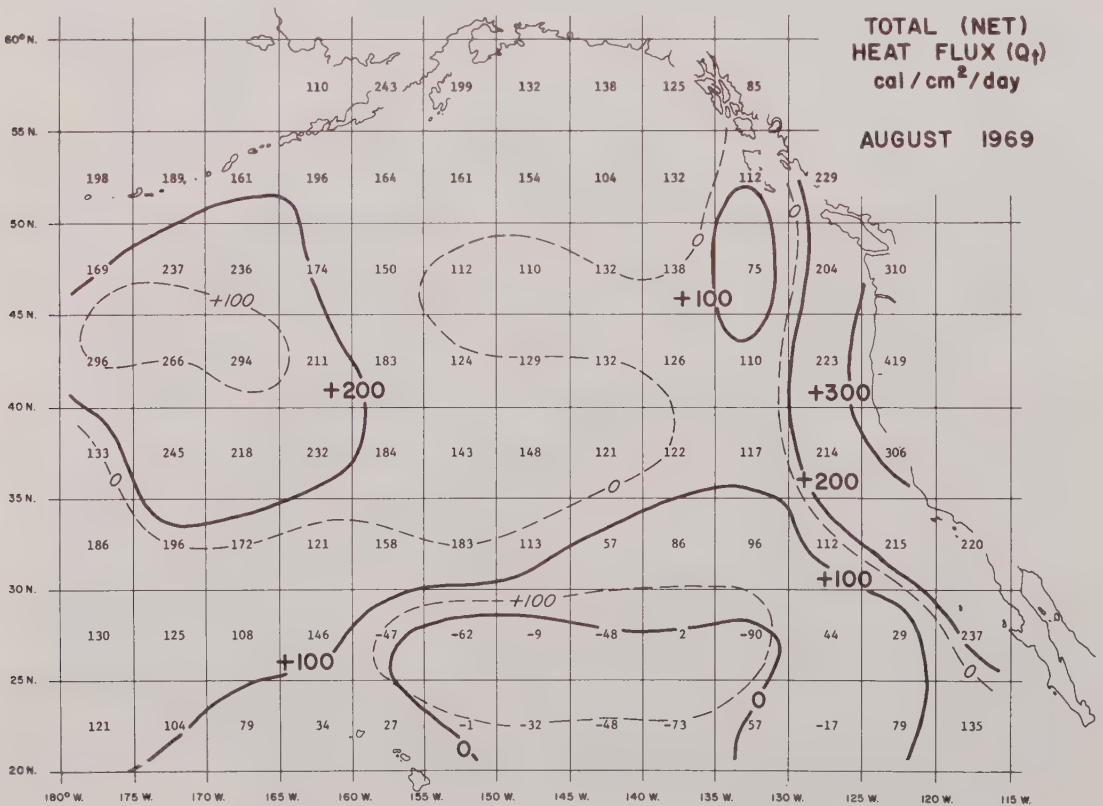

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
MARCH 1969
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
0
+100
+200
-100


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
APRIL 1969
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
0
+100
+200
-100


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
MAY 1969
+200
+100
-100
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JUNE 1969
+200
+100
-100
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JULY 1969
60° N.
55 N.
50 N.
45 N
40 N.
35 N
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+200
+200
+100
-100
+100
+300
+300
+200
+100
0
181 394 212 196 126 66 -3
191 164 179 199 240 223 183 115 137 71 193
172 191 185 200 232 207 203 188 145 121 163 255
147 226 236 245 246 174 204 167 169 94 137 413
239 229 190 224 195 194 124 83 90 89 185 339
317 273 274 219 268 153 241 32 10 -4 46 170 191
266 349 221 182 137 121 69 32 25 34 31 35 202
250 214 70 97 83 46 -165 -18 -69 -40 -60 7 83


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
AUGUST 1969
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+100
+200
+100
+300
+200
+100
+100
+100
0
0
0
0
110 243 199 132 138 125 85
198 189 161 196 164 161 154 104 132 112 229
169 237 236 174 150 112 110 132 138 75 204 310
296 266 294 211 183 124 129 132 126 110 223 419
133 245 218 232 184 143 148 121 122 117 214 306
186 196 172 121 158 183 113 57 86 96 112 215 220
130 125 108 146 47 62 9 48 2 90 44 29 237
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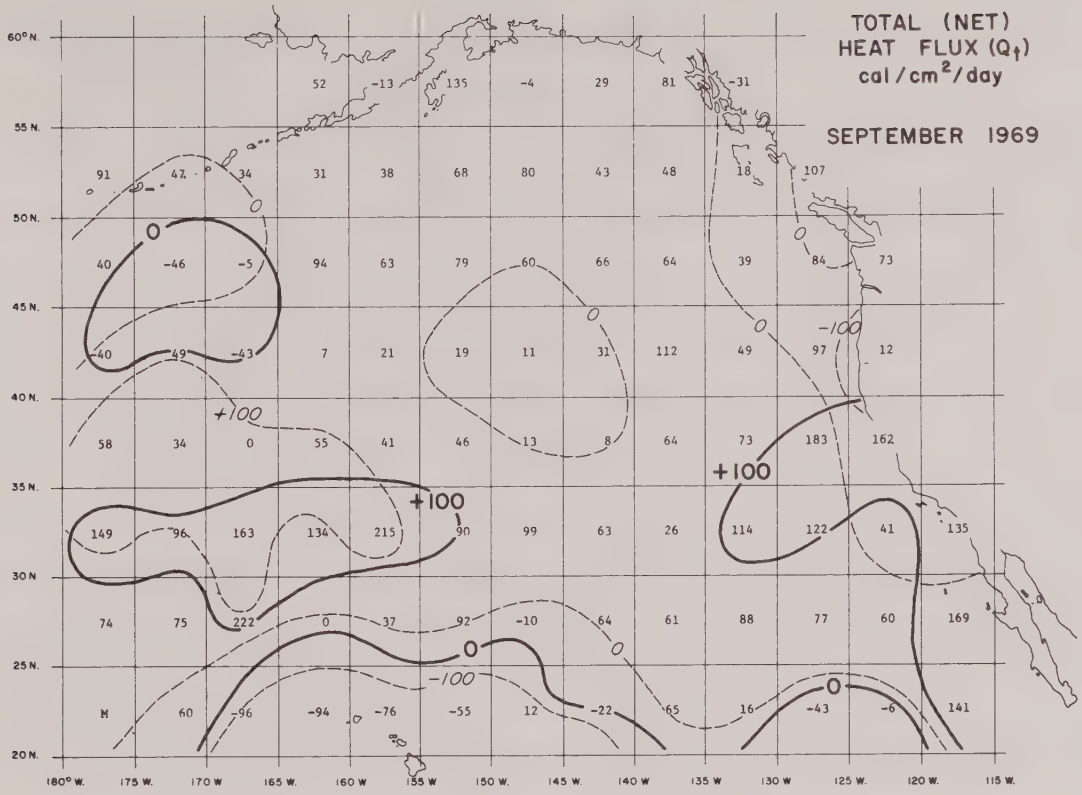
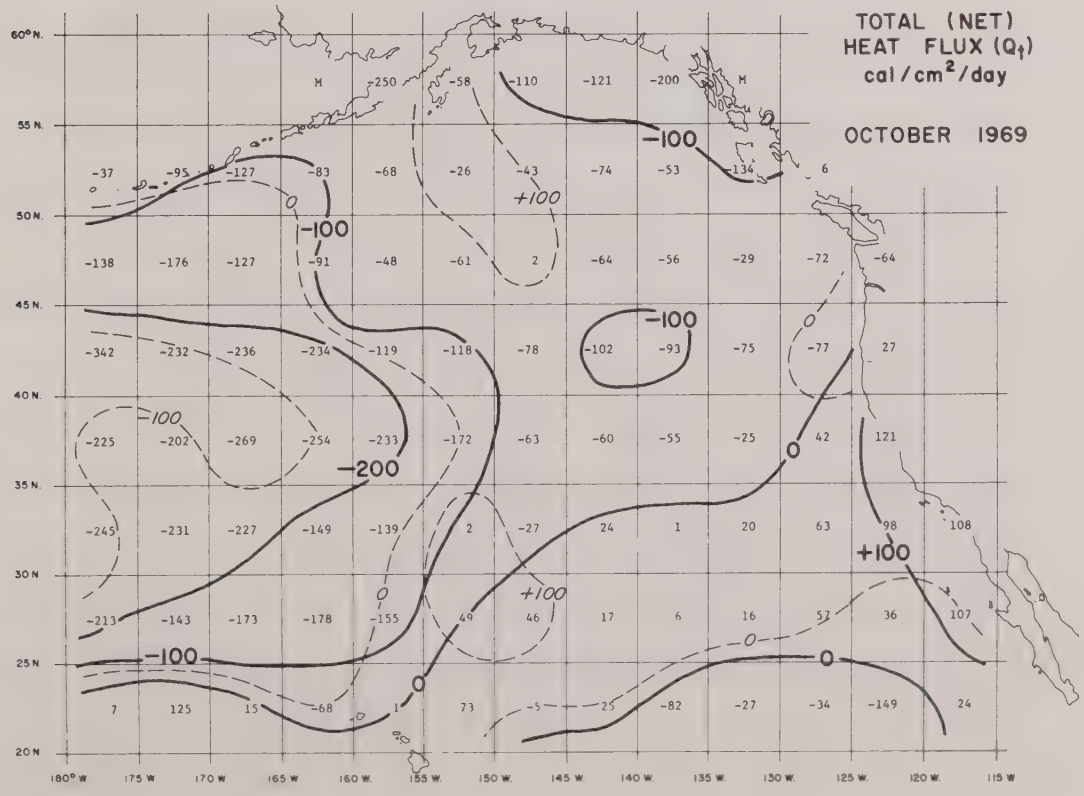
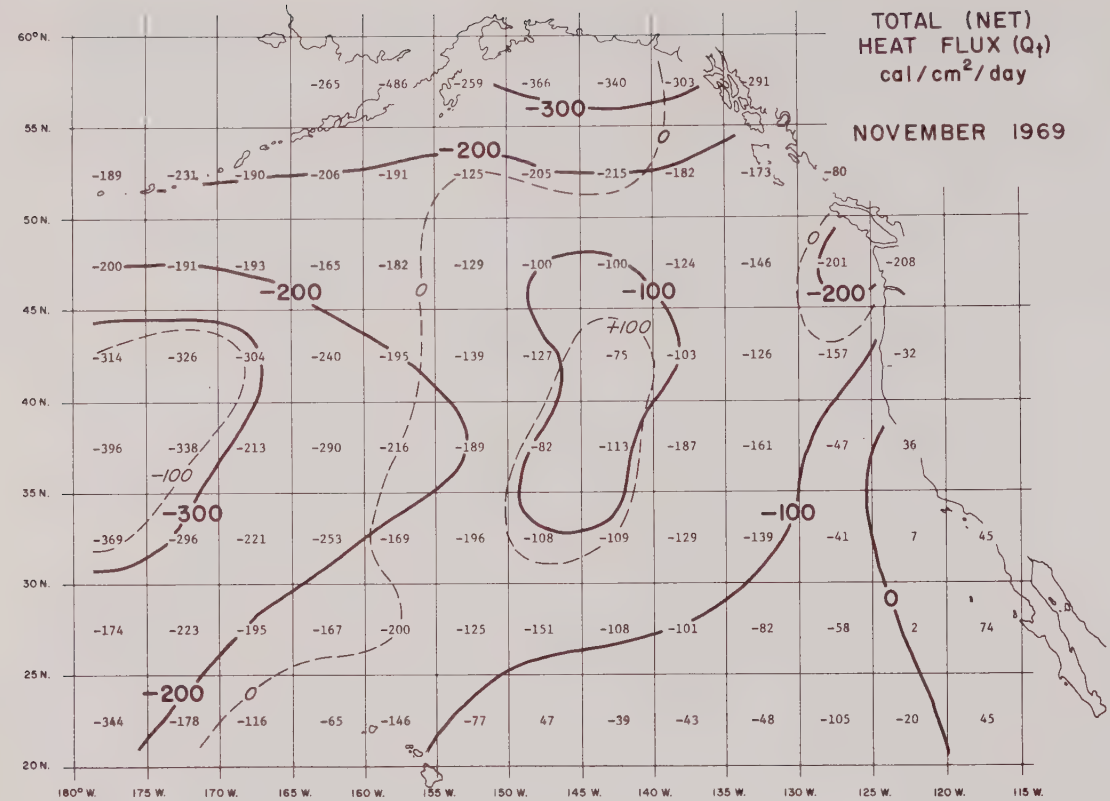

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
SEPTEMBER 1969
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W
165 W.
160 W
155 W
150 W.
145 W.
140 W
135 W
130 W
125 W.
120 W.
115 W.


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
OCTOBER 1969
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N
20 N
180° W
175 W
170 W
165 W
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
NOVEMBER 1969
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-300
-200
-100
0
-265 -486 -259 -366 -340 -303 -291
-189 -231 -190 -206 -191 -125 -205 -215 -182 -173 -80
-200 -191 -193 -165 -182 -129 -100 -100 -124 -146 -201 -208
-314 -326 -304 -240 -195 -139 -127 -75 -103 -126 -157 -32
-396 -338 -213 -290 -216 -189 -82 -113 -187 -161 -47 36
-369 -296 -221 -253 -169 -196 -108 -109 -129 -139 -41 7 45
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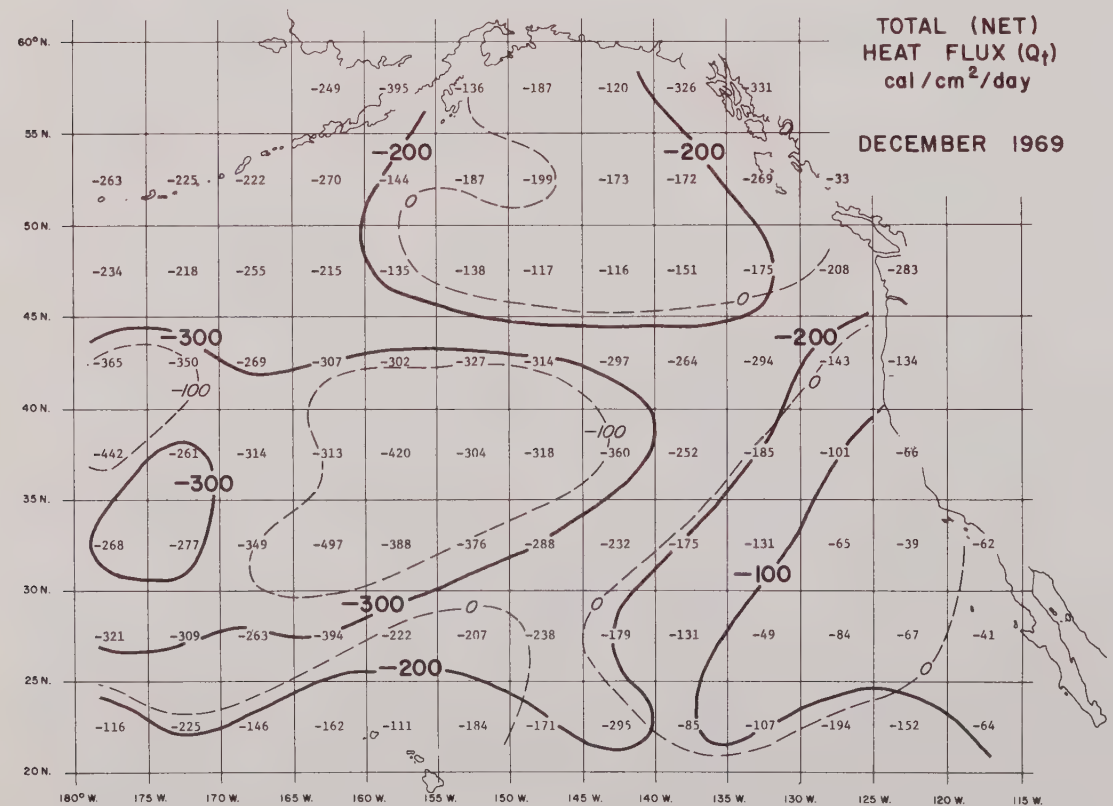
-344 -178 -116 -65 -146 -77 47 -39 -43 -48 -105 -20 45


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
DECEMBER 1969
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-300
-200
-100
0
-249 -395 -136 -187 -120 -326 -331
-263 -225 -222 -270 -144 -187 -199 -173 -172 -269 -33
-234 -218 -255 -215 -135 -138 -117 -116 -151 -175 -208 -283
-365 -350 -269 -307 -302 -327 -314 -297 -264 -294 -143 -134
-442 -261 -314 -313 -420 -304 -318 -360 -252 -185 -101 -66
-268 -277 -349 -497 -388 -376 -288 -232 -175 -131 -65 -39 -62
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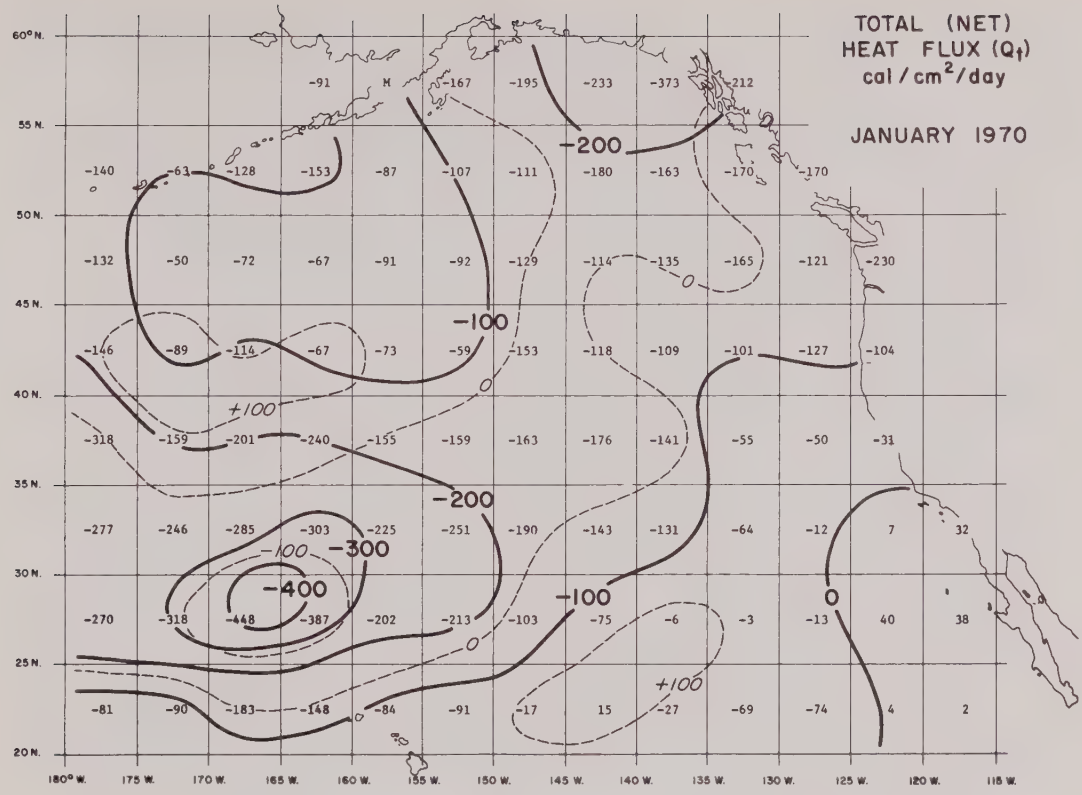
TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JANUARY 1970
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-91 M -167 -195 -233 -373 -212
-140 -63 -128 -153 -87 -107 -111 -180 -163 -170 -170
-132 -50 -72 -67 -91 -92 -129 -114 -135 -165 -121 -230
-146 -89 -114 -67 -73 -59 -153 -118 -109 -101 -127 -104
-318 -159 -201 -240 -155 -159 -163 -176 -141 -55 -50 -31
-277 -246 -285 -303 -225 -251 -190 -143 -131 -64 -12 7 32
-270 -318 -448 -387 -202 -213 -103 -75 -6 -3 -13 40 38
-81 -90 -183 -148 -84 -91 -17 15 -27 -69 -74 4 2
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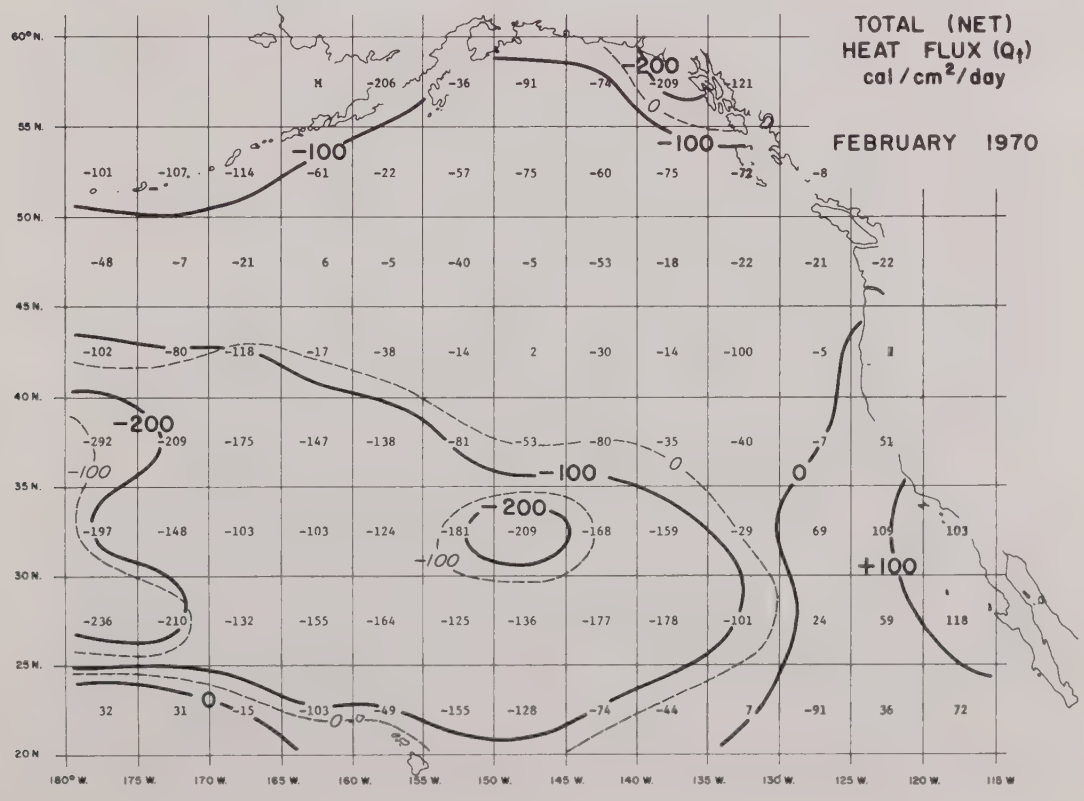
-100
+100
-300
-400
0


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
FEBRUARY 1970
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W
M -206 -36 -91 -74 -209 -121
-101 -107 -114 -61 -22 -57 -75 -60 -75 -72 -8
-48 -7 -21 6 -5 -40 -5 -53 -18 -22 -21 -22
-102 -80 -118 -17 -38 -14 2 -30 -14 -100 -5
-292 -209 -175 -147 -138 -81 -53 -80 -35 -40 -7 51
-197 -148 -103 -103 -124 -181 -209 -168 -159 -29 69 109 103
-236 -210 -132 -155 -164 -125 -136 -177 -178 -101 24 59 118
32 31 -15 -103 -49 -155 -128 -74 -44 7 -91 36 72
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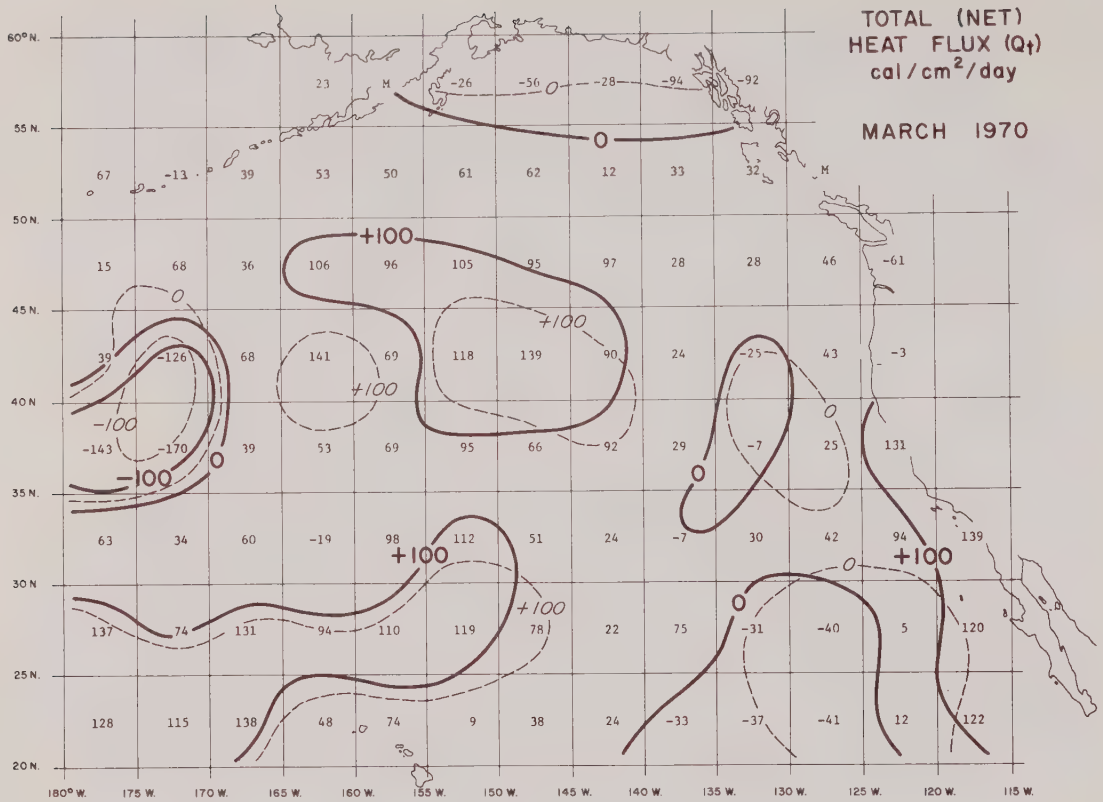
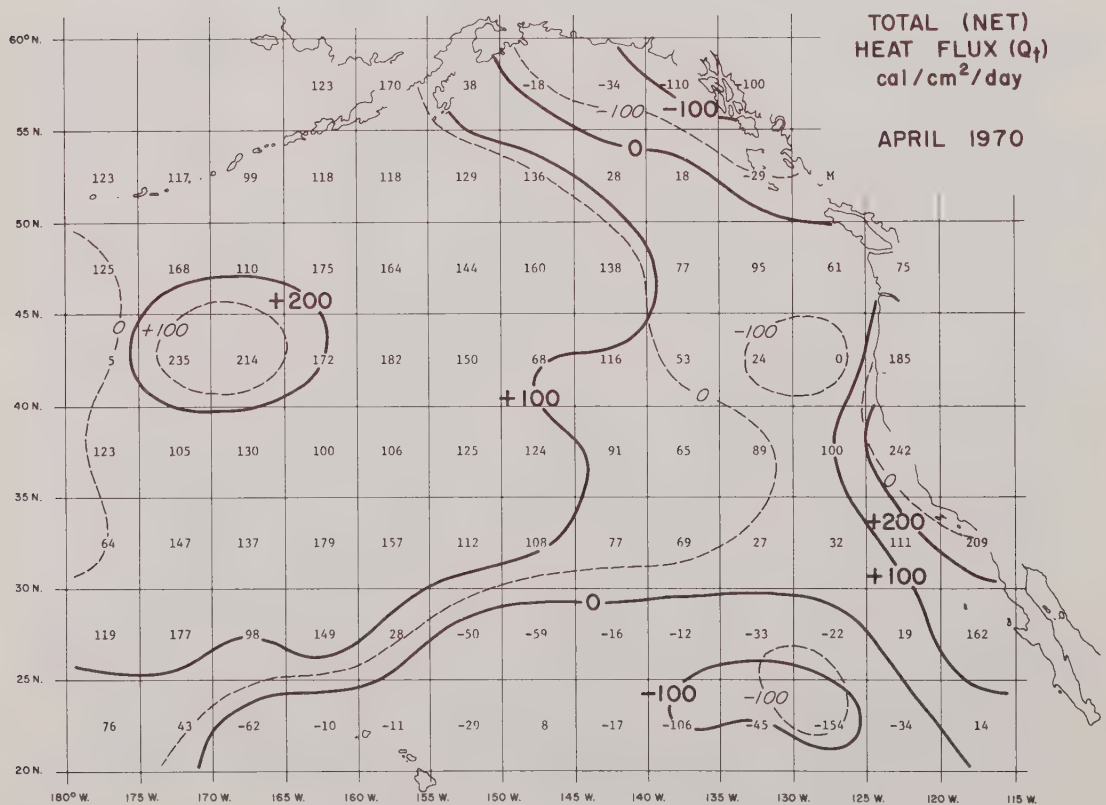
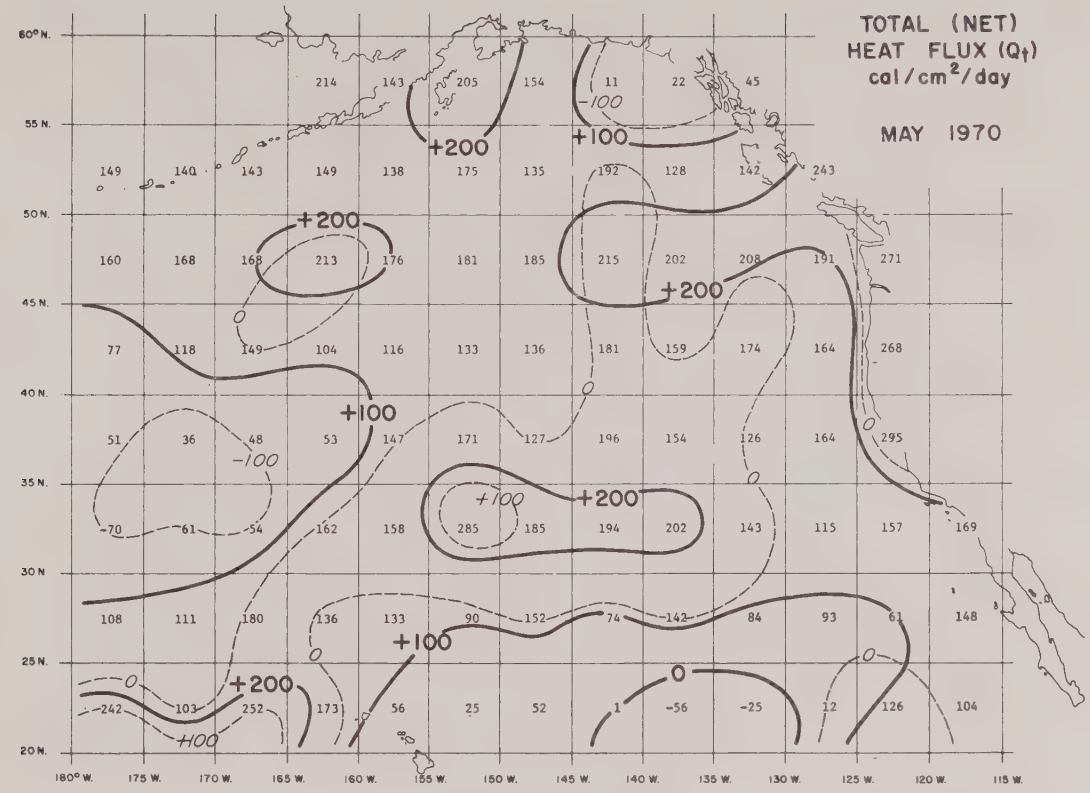
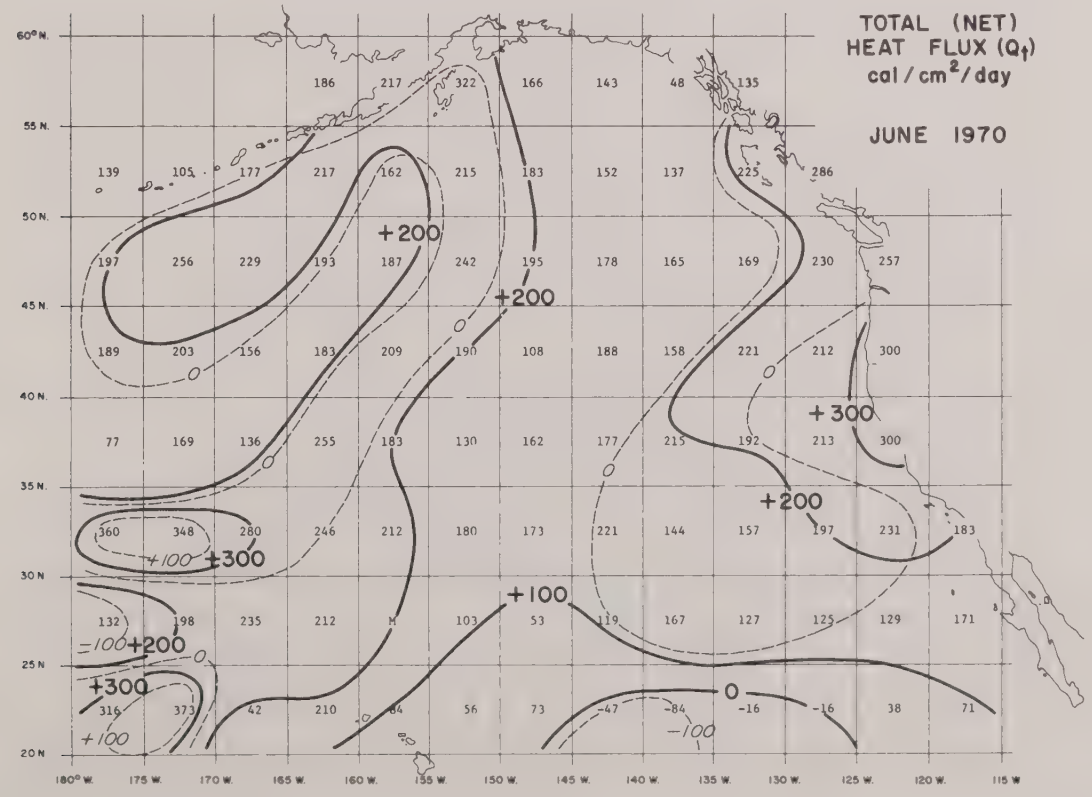
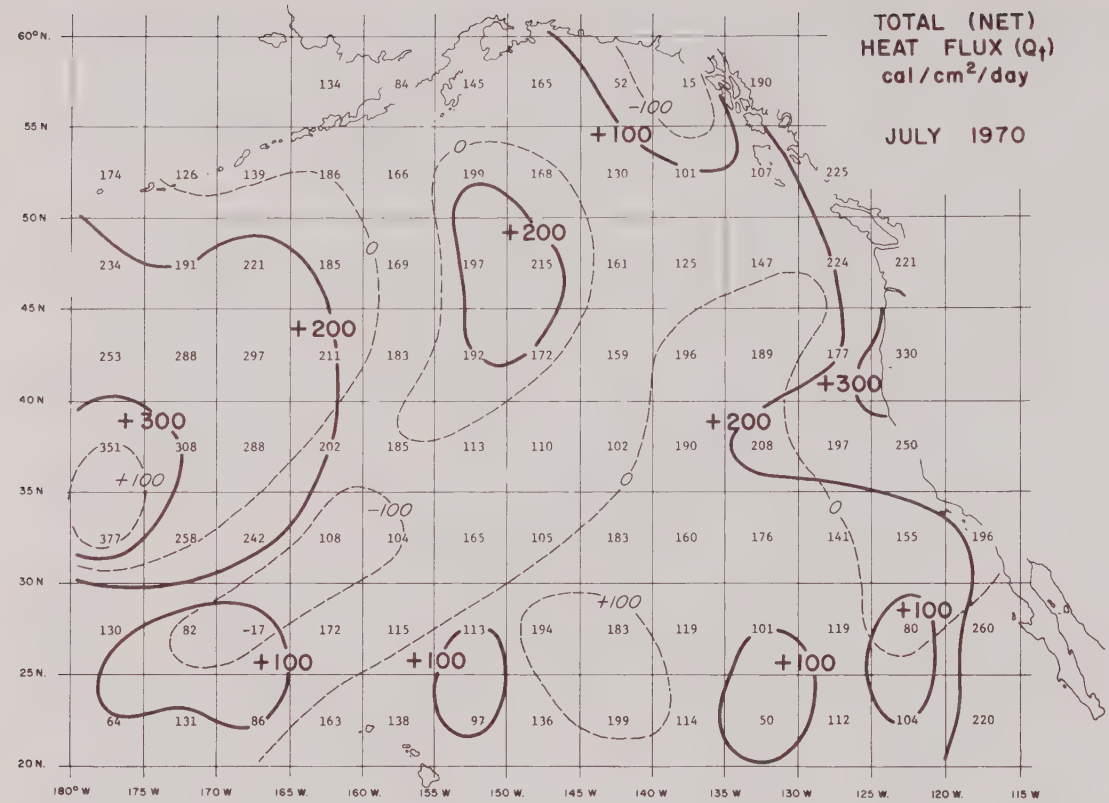
-100
+100
0

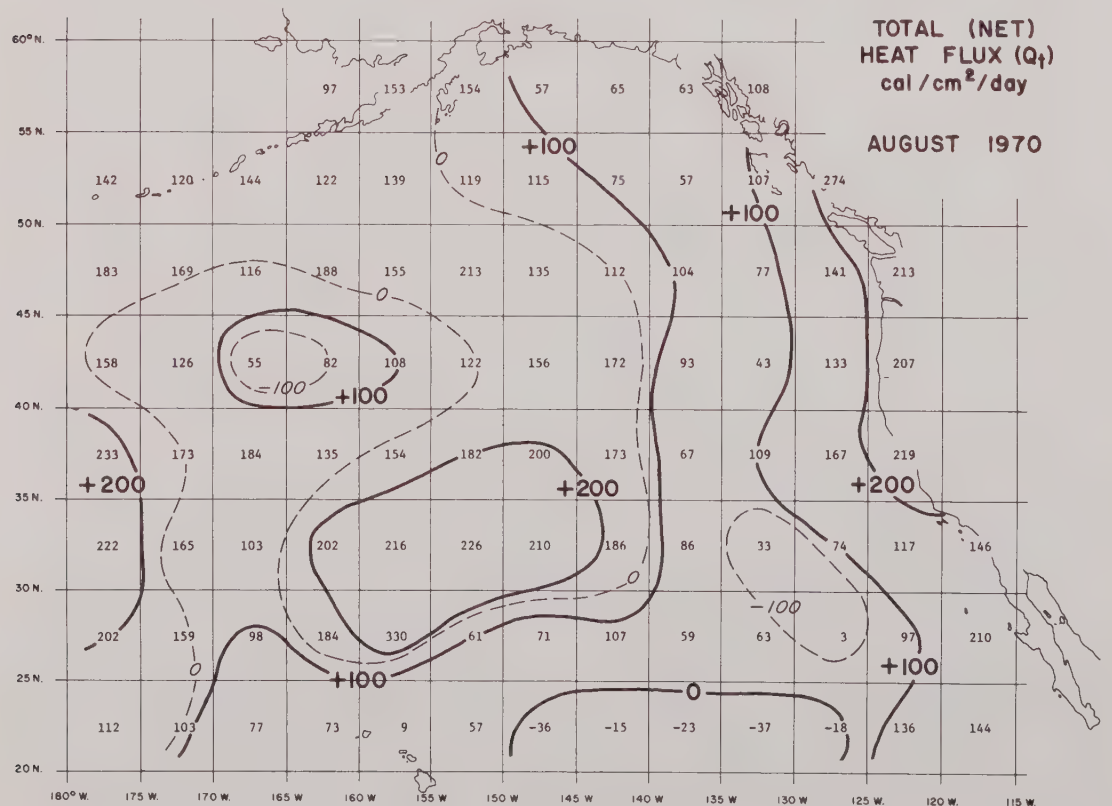

TOTAL (NET)
HEAT FLUX (Q_t)
cal/cm²/day
MARCH 1970
60° N.
55 N.
50 N.
45 N.
40 N
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+100
0
-100

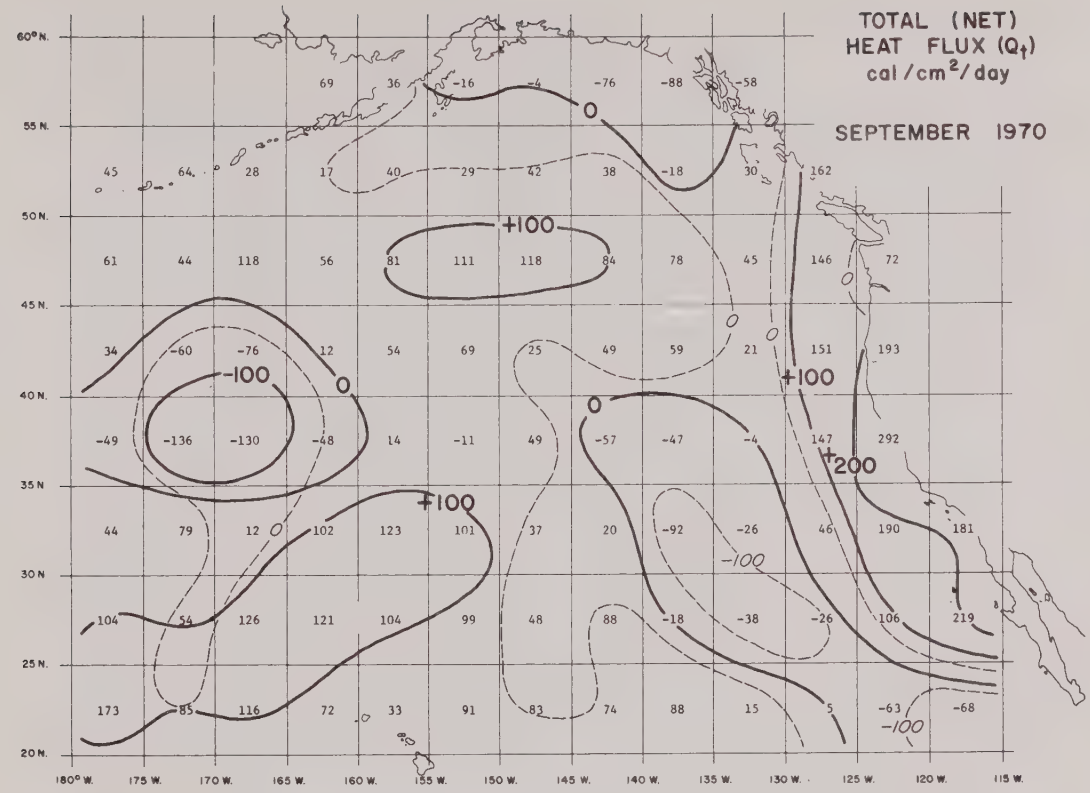

TOTAL (NET)
HEAT FLUX (Q_t)
cal/cm²/day
APRIL 1970
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+200
+100
0
-100


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
MAY 1970
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+200
+100
-100
0


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JUNE 1970
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+300
+200
+100
-100
0


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm² / day
JULY 1970
60° N.
55 N
50 N
45 N
40 N
35 N
30 N
25 N.
20 N.
180° W
175 W
170 W
165 W.
160 W.
155 W
150 W.
145 W
140 W
135 W
130 W
125 W.
120 W.
115 W
+100
+200
+300
-100
0


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm² / day
AUGUST 1970
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W
160 W
155 W
150 W
145 W
140 W
135 W
130 W
125 W.
120 W.
115 W.
+100
+200
-100
0


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
SEPTEMBER 1970
60° N.
55 N.
50 N.
45 N.
40 N.
35 N
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
69 36 -16 -4 -76 -88 -58
45 64 28 17 40 29 42 38 -18 30 162
61 44 118 56 81 111 118 84 78 45 146 72
34 -60 -76 12 54 69 25 49 59 21 151 193
-49 -136 -130 -48 14 -11 49 -57 -47 -4 147 292
44 79 12 102 123 101 37 20 -92 -26 46 190 181
104 54 126 121 104 99 48 88 -18 -38 -26 106 219
173 85 116 72 33 91 83 74 88 15 5 -63 -68
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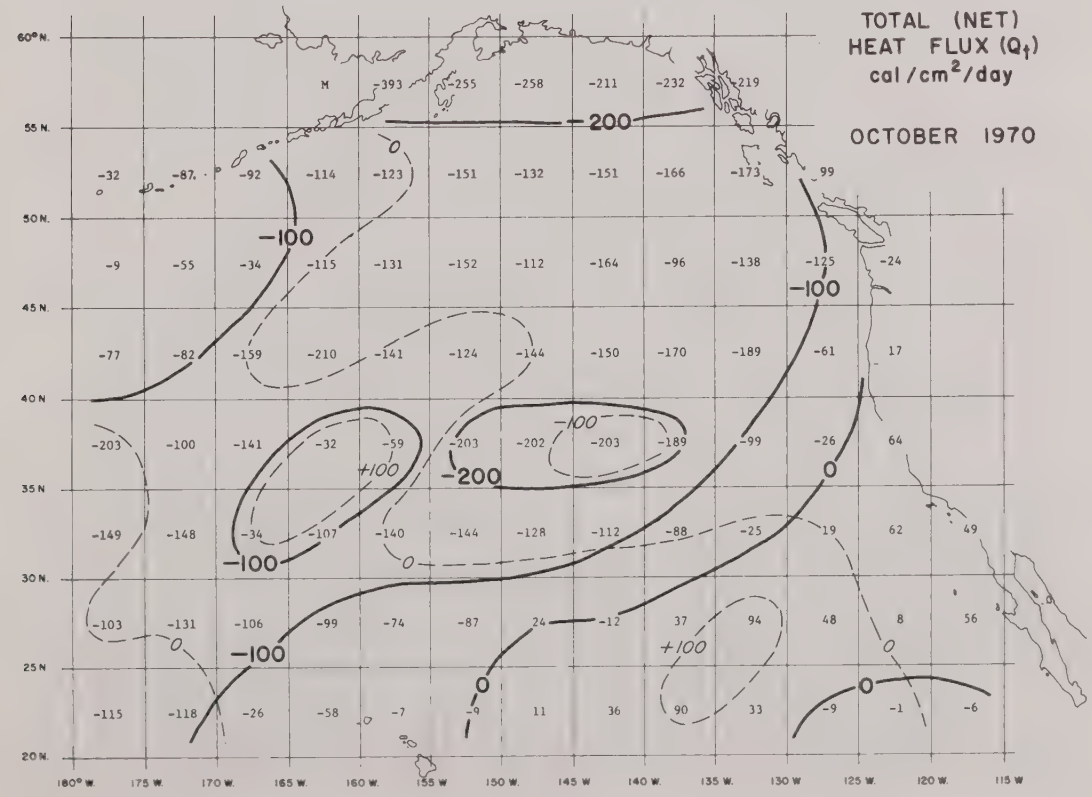
-100
+100
+200


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
OCTOBER 1970
60° N.
55 N.
50 N.
45 N.
40 N
35 N
30 N.
25 N
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W
150 W.
145 W
140 W.
135 W.
130 W
125 W.
120 W.
115 W
M -393 -255 -258 -211 -232 219
-32 -87 -92 -114 -123 -151 -132 -151 -166 -173 99
-9 -55 -34 -115 -131 -152 -112 -164 -96 -138 -125 -24
-77 -82 -159 -210 -141 -124 -144 -150 -170 -189 -61 17
-203 -100 -141 -32 -59 -203 -202 -203 -189 -99 -26 64
-149 -148 -34 -107 -140 -144 -128 -112 -88 -25 19 62 49
-103 -131 -106 -99 -74 -87 24 -12 37 94 48 8 56
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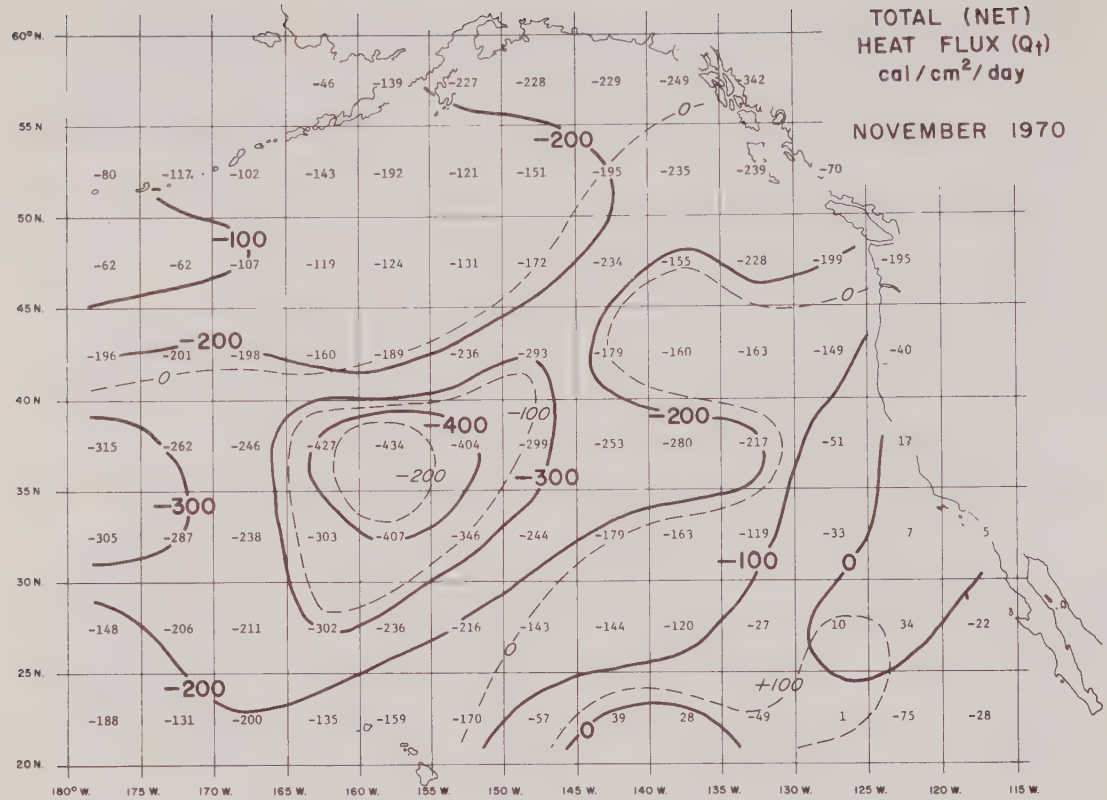
-100
-200
+100


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
NOVEMBER 1970
60°N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-46 -139 -227 -228 -229 -249 -342
-80 -117 -102 -143 -192 -121 -151 -195 -235 -239 -70
-62 -62 -107 -119 -124 -131 -172 -234 -155 -228 -199 -195
-196 -201 -198 -160 -189 -236 -293 -179 -160 -163 -149 -40
-315 -262 -246 -427 -434 -404 -299 -253 -280 -217 -51 17
-305 -287 -238 -303 -407 -346 -244 -179 -163 -119 -33 7 5
-148 -206 -211 -302 -236 -216 -143 -144 -120 -27 10 34 -22
-188 -131 -200 -135 -159 -170 -57 39 28 -49 1 -75 -28
-200
-100
-200
-400
-100
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-300
-300
-100
0
-200
+100
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0
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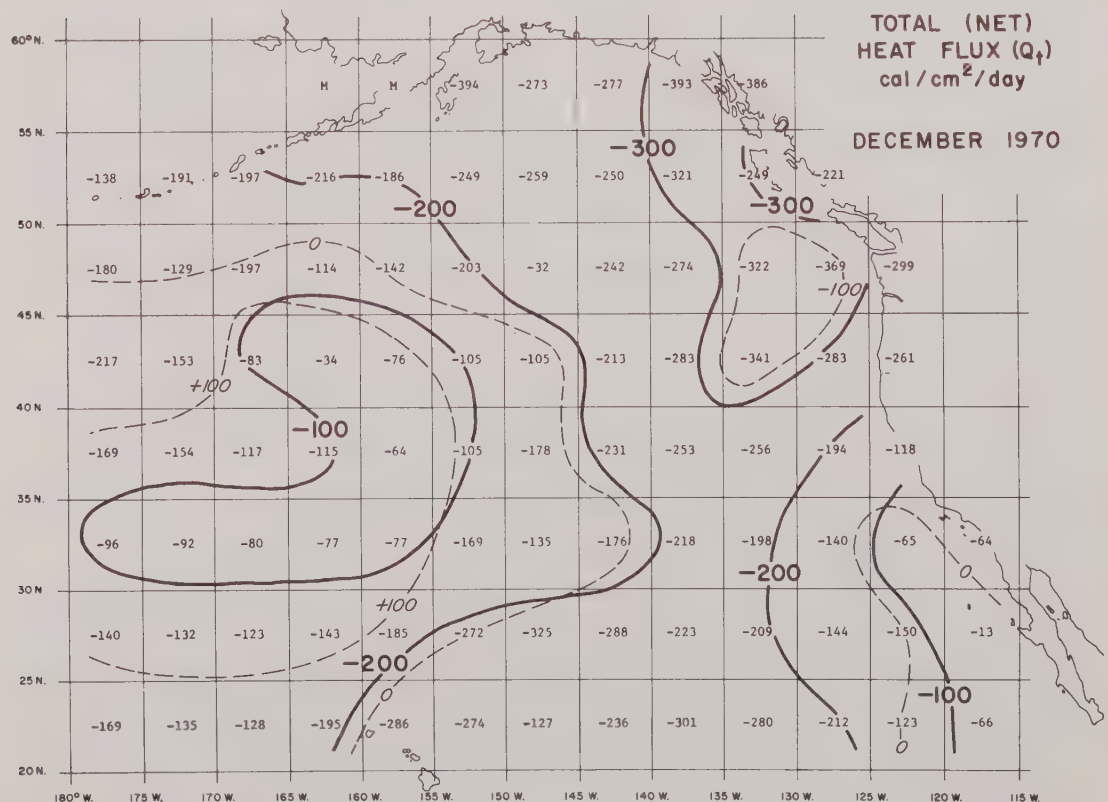
0
0
0
0
0


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
DECEMBER 1970
60°N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
M M -394 -273 -277 -393 -386
-138 -191 -197 -216 -186 -249 -259 -250 -321 -249 -221
-180 -129 -197 -114 -142 -203 -32 -242 -274 -322 -369 -299
-217 -153 -83 -34 -76 -105 -105 -213 -283 -341 -283 -261
-169 -154 -117 -115 -64 -105 -178 -231 -253 -256 -194 -118
-96 -92 -80 -77 -77 -169 -135 -176 -218 -198 -140 -65 -64
-140 -132 -123 -143 -185 -272 -325 -288 -223 -209 -144 -150 -13
-169 -135 -128 -195 -286 -274 -127 -236 -301 -280 -212 -123 -66
-300
-200
-300
-100
+100
-100
+100
-200
-200
-100
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0
0
0
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0
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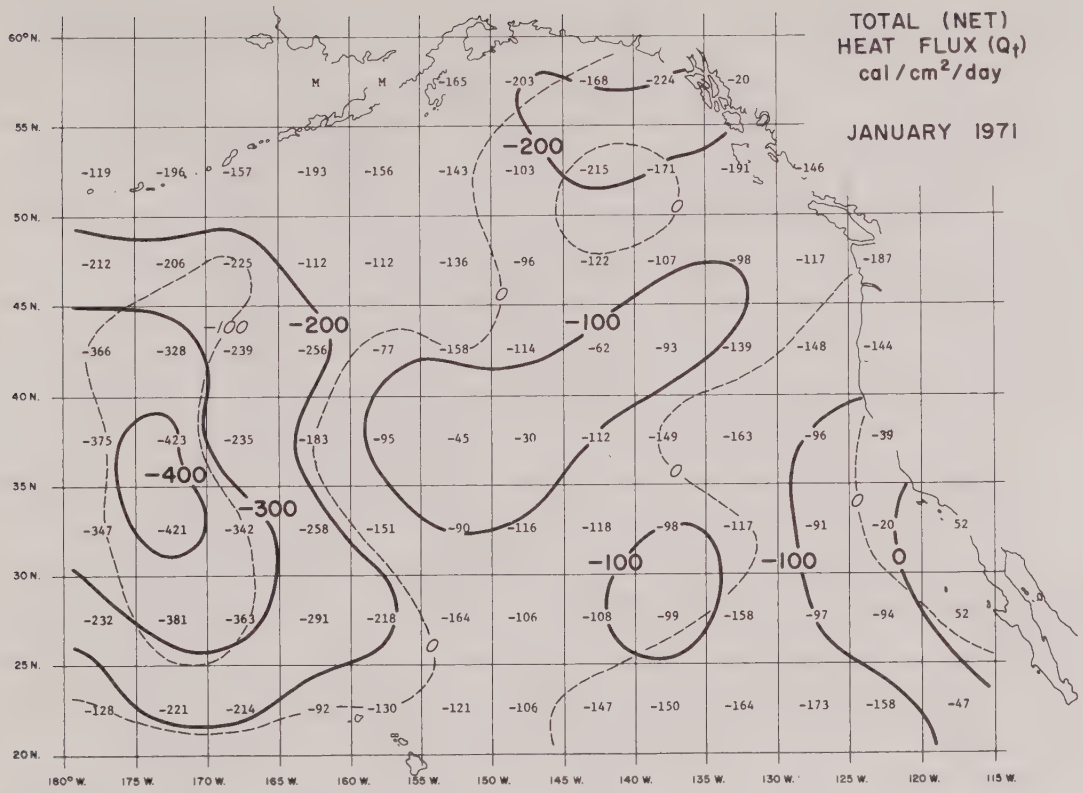
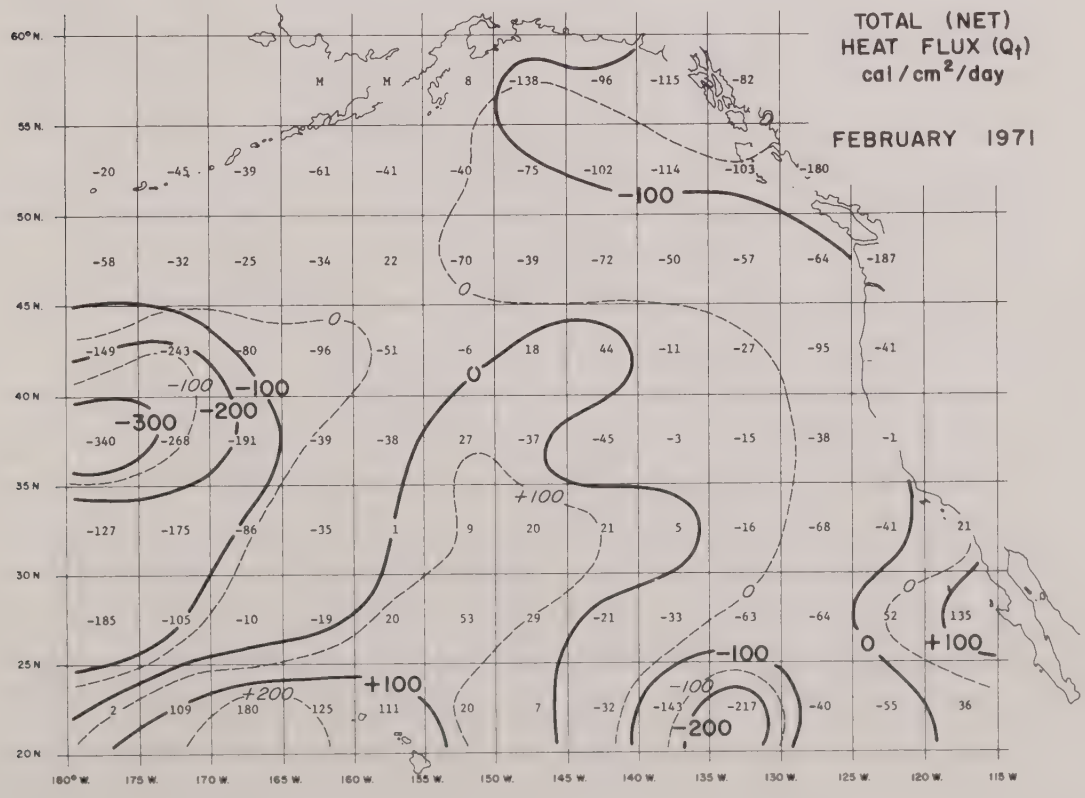
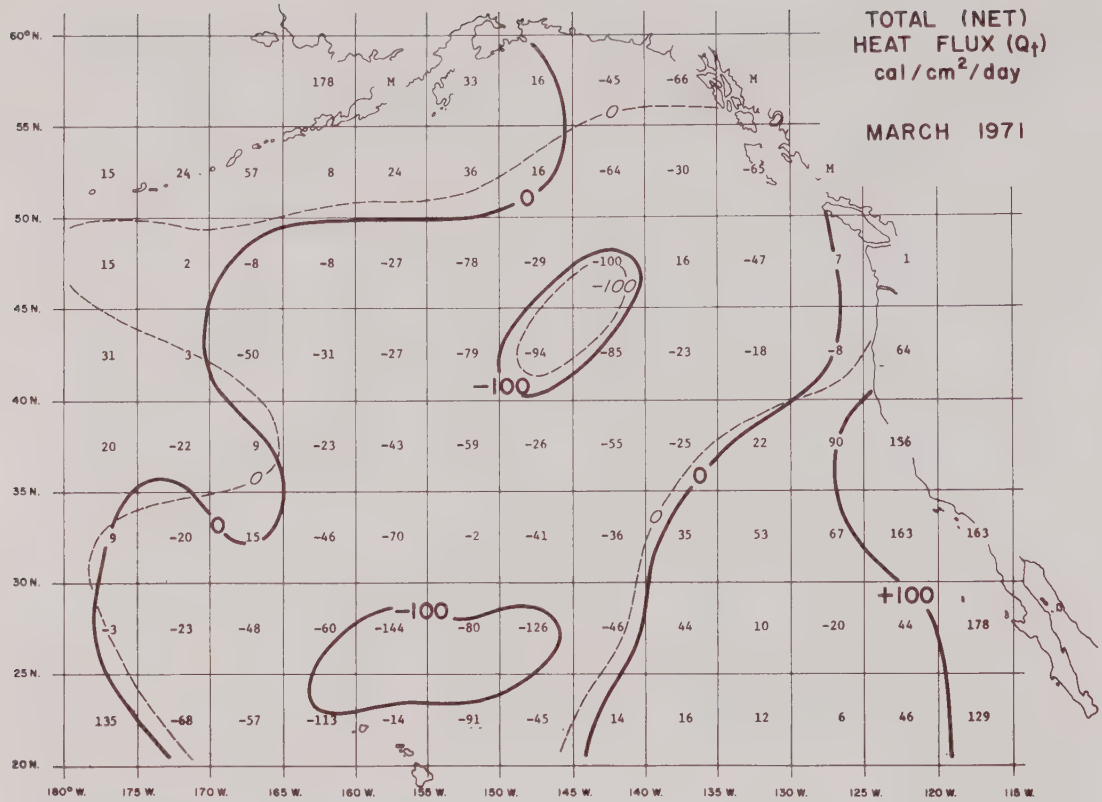
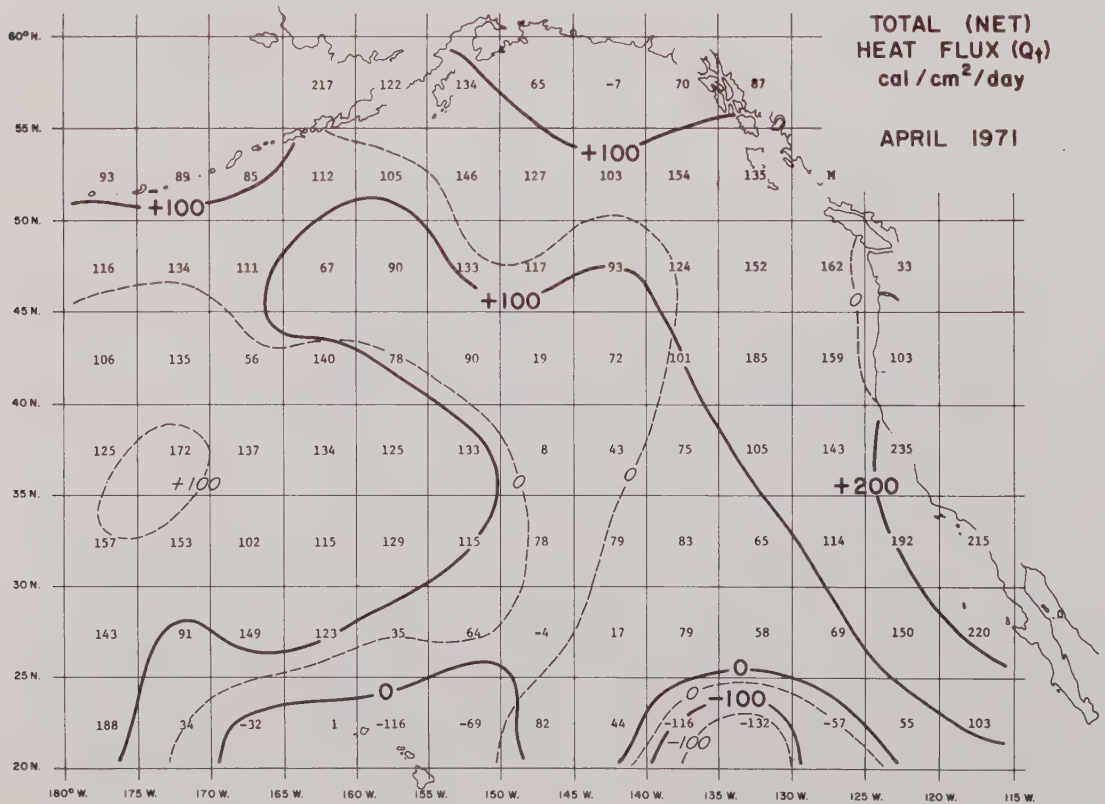
0
0


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JANUARY 1971
60° N.
55 N.
50 N.
45 N.
40 N.
35 N
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-200
-100
-400
-300
0


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
FEBRUARY 1971
60° N.
55 N.
50 N.
45 N.
40 N
35 N
30 N
25 N
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W
-100
-200
-300
0
+100
+200


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
MARCH 1971
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
178 M 33 16 -45 -66 M
15 24 57 8 24 36 16 -64 -30 -65 M
15 2 -8 -8 -27 -78 -29 -100 16 -47 7 1
-100
31 3 -50 -31 -27 -79 -94 -85 -23 -18 -8 64
-100
20 -22 9 -23 -43 -59 -26 -55 -25 22 90 156
0
9 -20 15 -46 -70 -2 -41 -36 35 53 67 163 163
-100
+100
-3 -23 -48 -60 -144 -80 -126 -46 44 10 -20 44 178
135 -68 -57 -113 -14 -91 -45 14 16 12 6 46 129


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
APRIL 1971
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
217 122 134 65 -7 70 87
+100
93 89 85 112 105 146 127 103 154 135 M
+100
116 134 111 67 90 133 117 93 124 152 162 33
+100
106 135 56 140 78 90 19 72 101 185 159 103
125 172 137 134 125 133 8 43 75 105 143 235
+100
+200
157 153 102 115 129 115 78 79 83 65 114 192 215
143 91 149 123 35 64 -4 17 79 58 69 150 220
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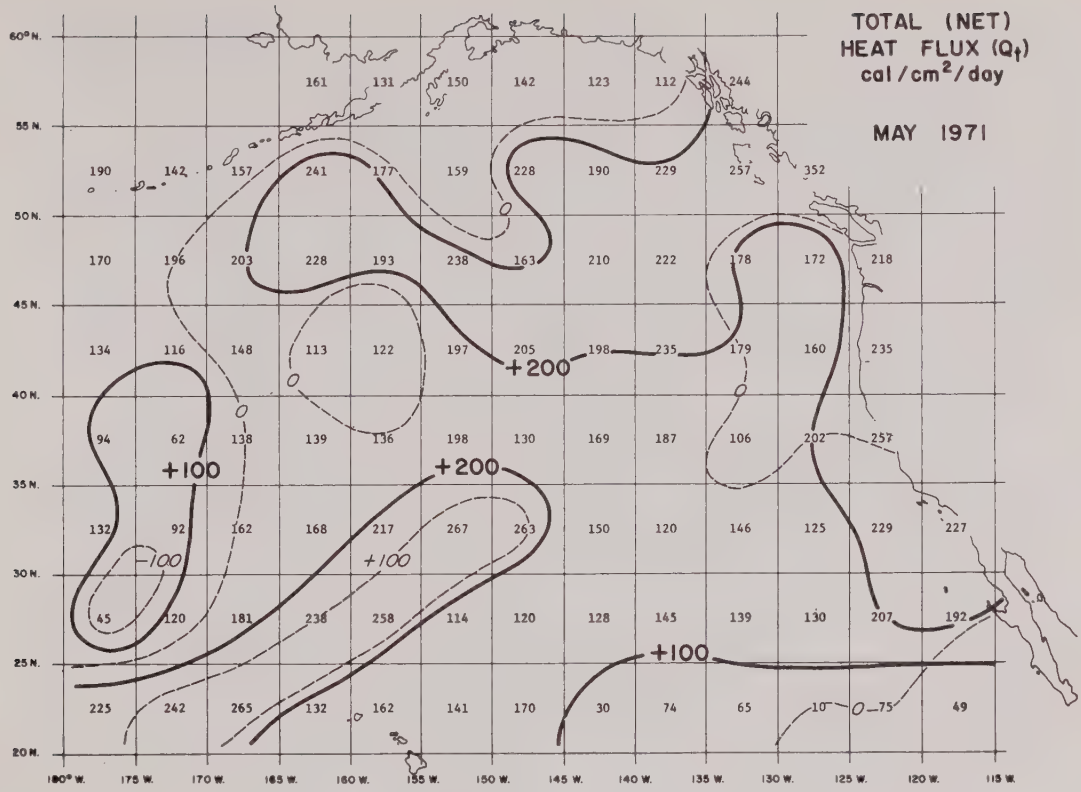
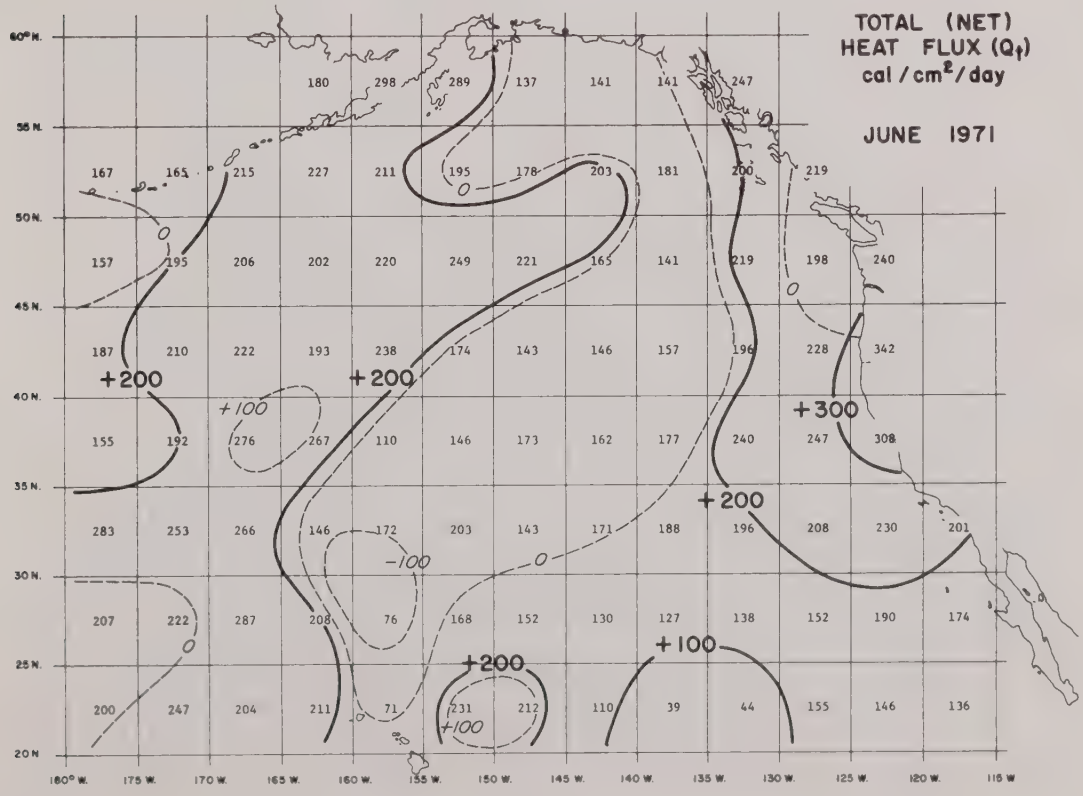
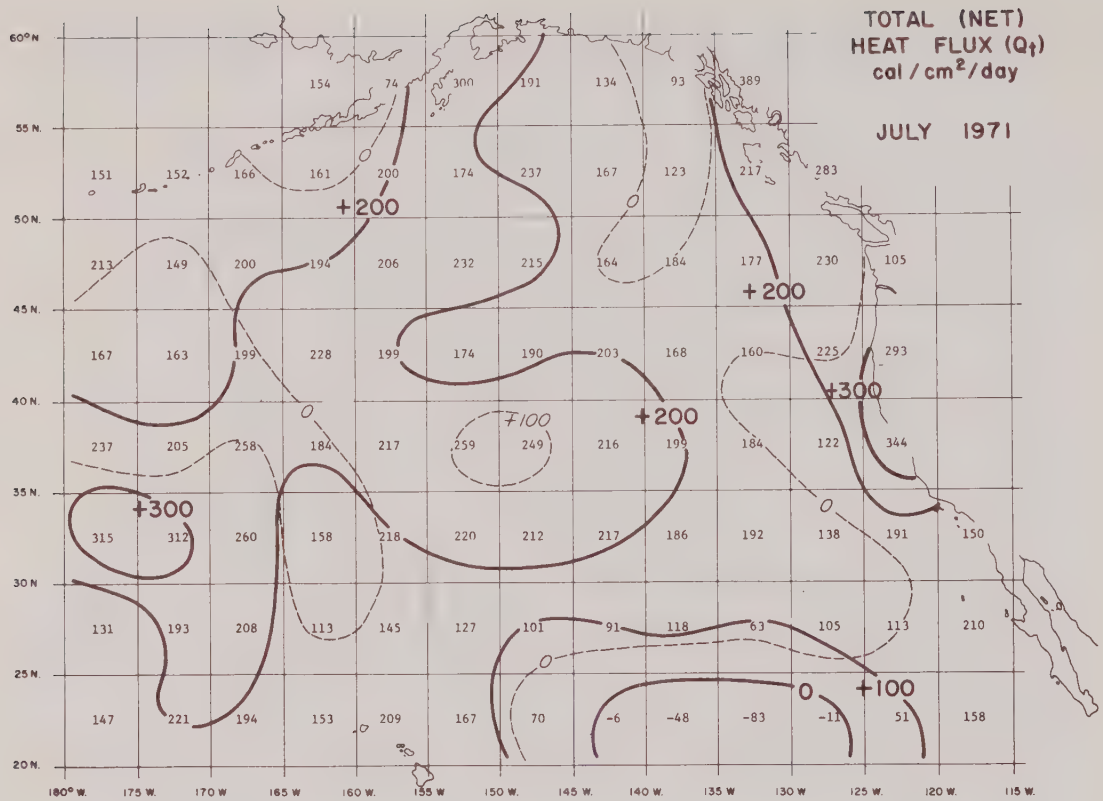
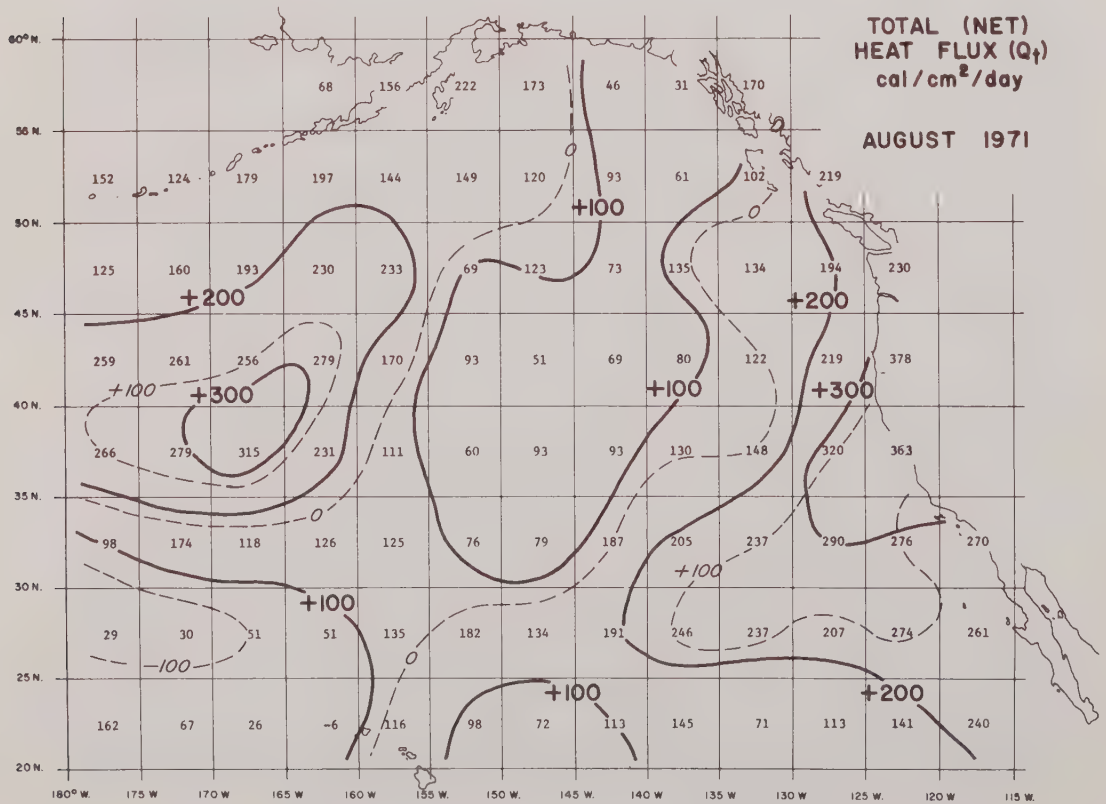
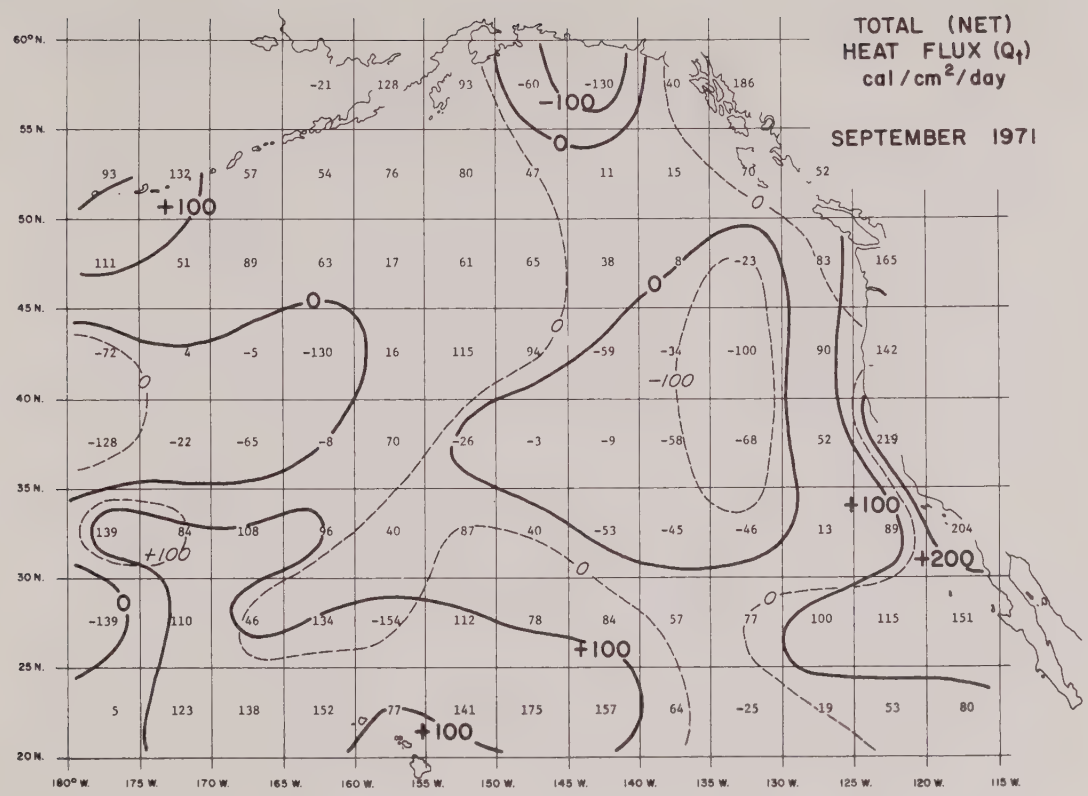
0
0
-100
188 34 -32 1 -116 -69 82 44 -116 -132 -57 55 103
-100

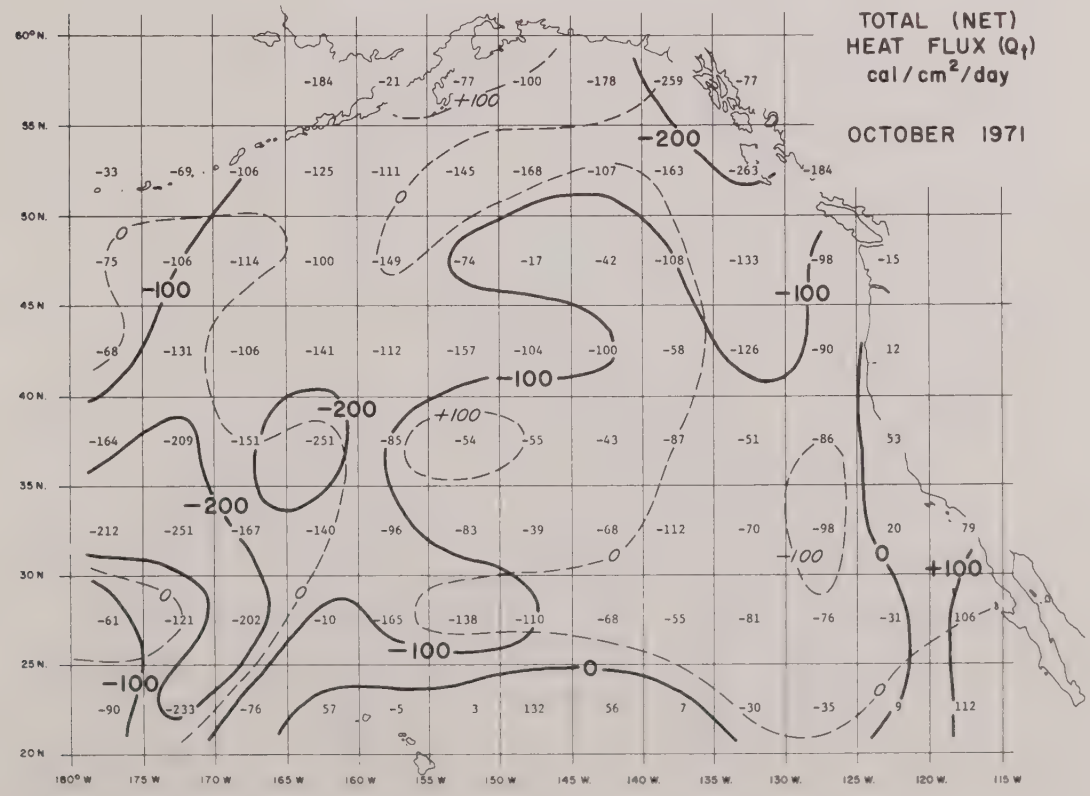

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm² / day
MAY 1971
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+100
+200
-100
0

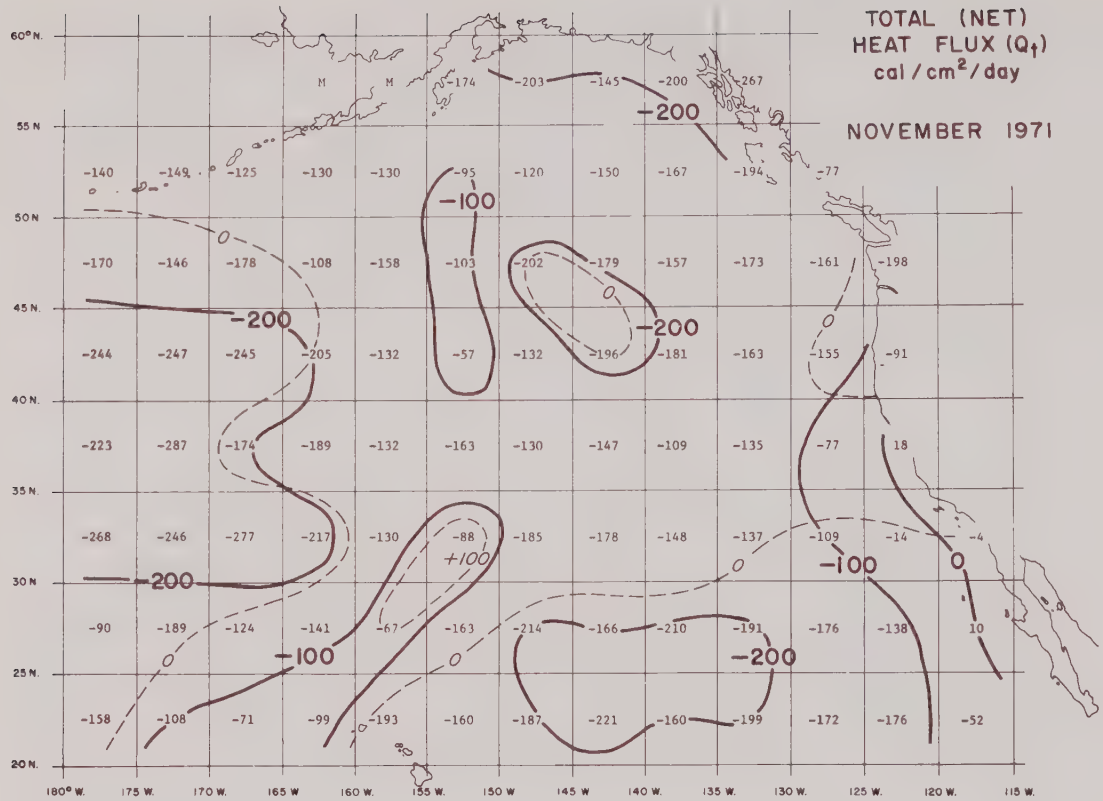

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm² / day
JUNE 1971
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W
+100
+200
+300
-100
0

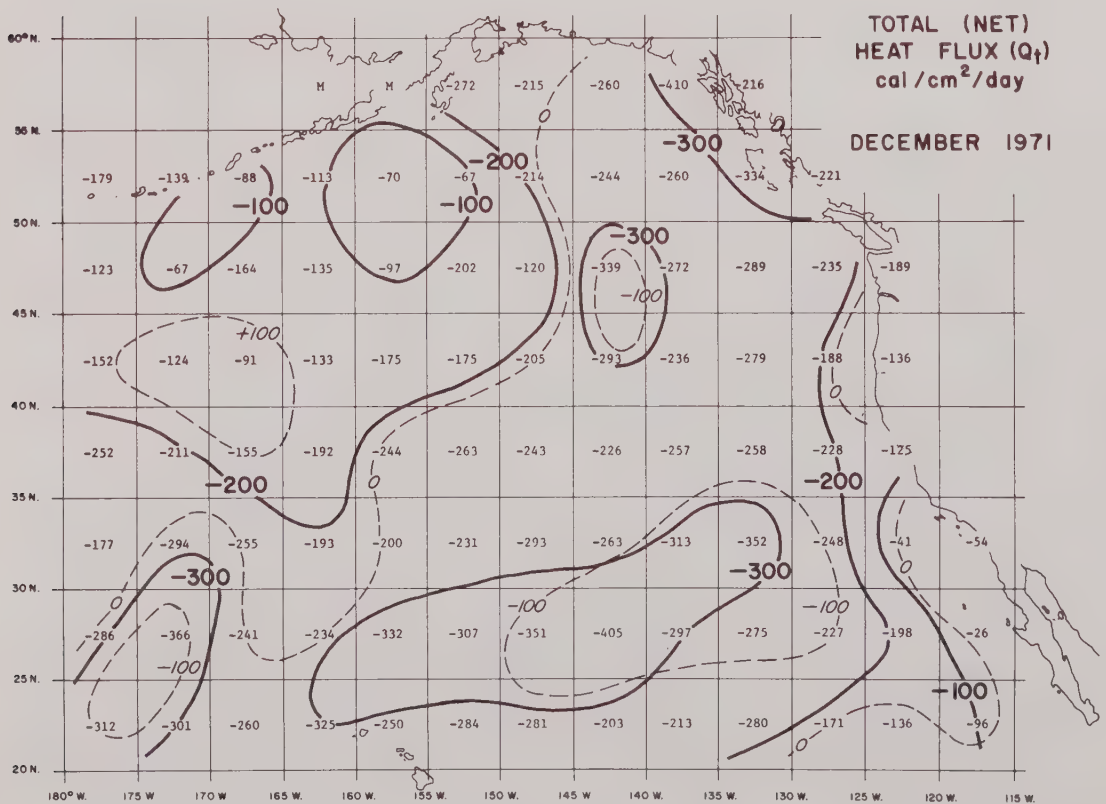

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
JULY 1971
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W
165 W
160 W.
155 W
150 W.
145 W.
140 W.
135 W
130 W
125 W.
120 W.
115 W.
+200
+300
+100
0
-100


TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
AUGUST 1971
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W
170 W
165 W
160 W
155 W.
150 W.
145 W.
140 W
135 W
130 W
125 W.
120 W
115 W.
+100
+200
+300
0
-100

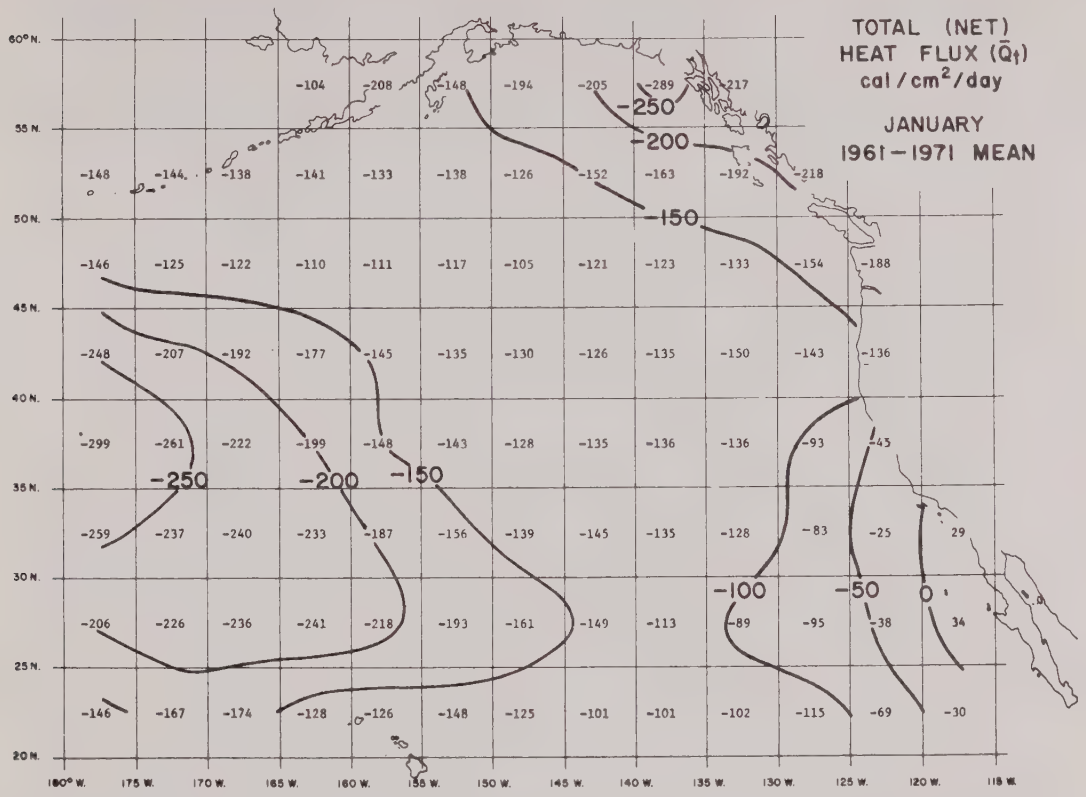

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
SEPTEMBER 1971
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

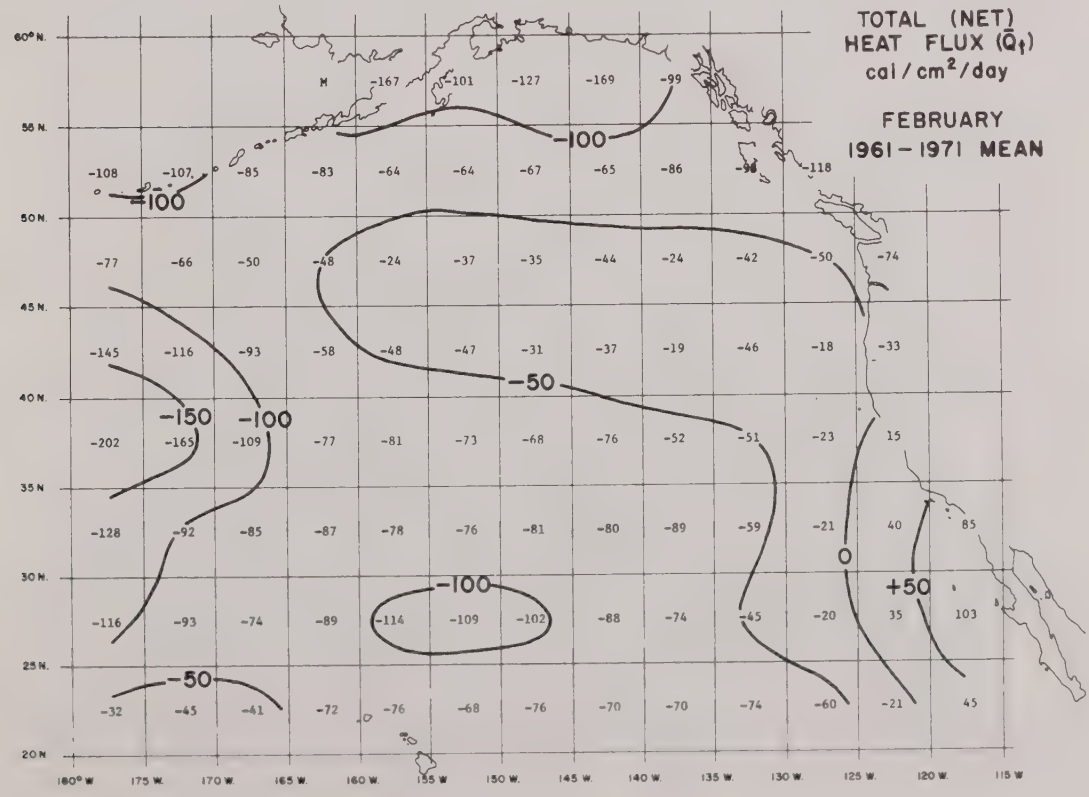

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
OCTOBER 1971
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

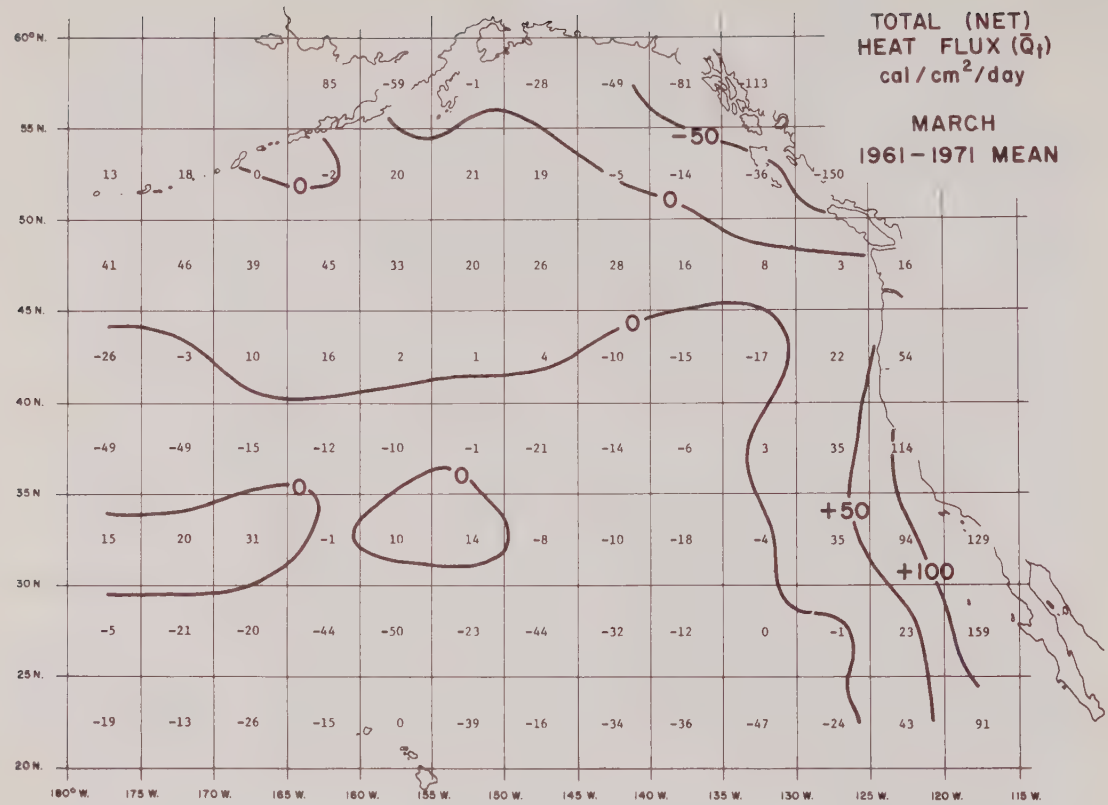

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
NOVEMBER 1971
60° N.
55 N
50 N
45 N.
40 N.
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W
160 W.
155 W.
150 W
145 W
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-200
-100
+100
0

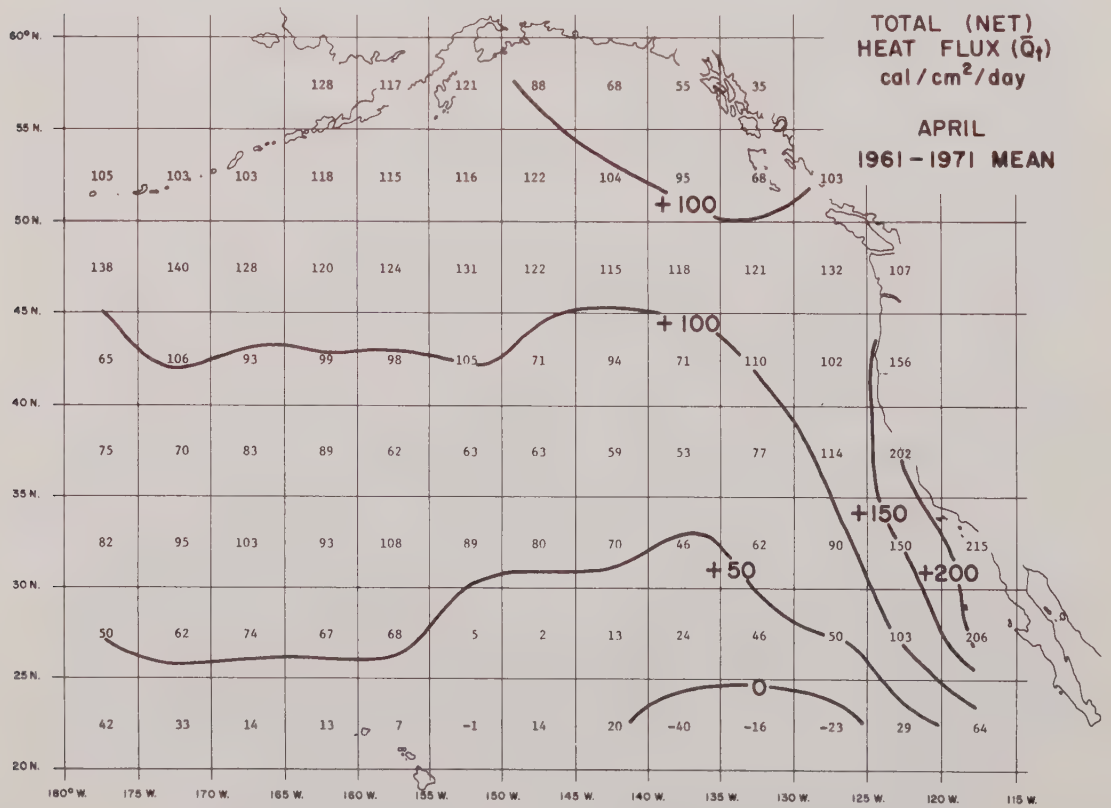

TOTAL (NET)
HEAT FLUX (Q_t)
cal / cm^2 / day
DECEMBER 1971
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W
170 W
165 W.
160 W.
155 W.
150 W.
145 W
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-300
-200
-100
+100
0

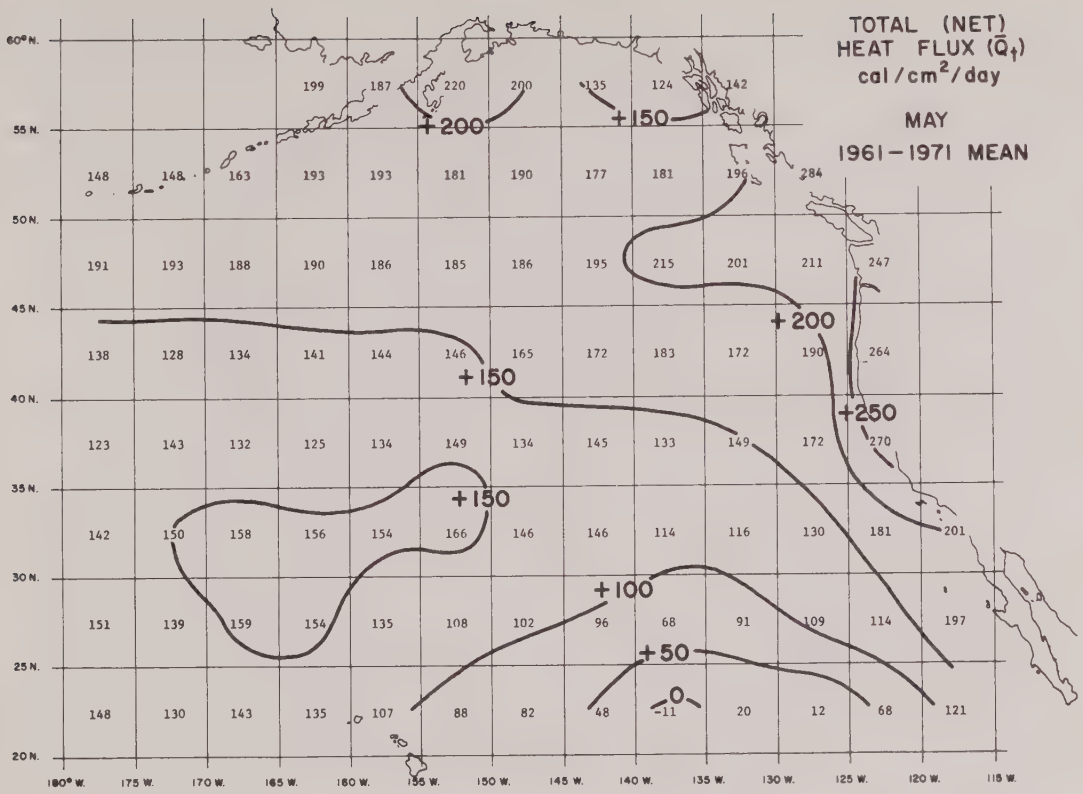
PART 2. TOTAL (NET) HEAT FLUX 1961-71 MEAN MONTHLY VALUES (NORMALS).

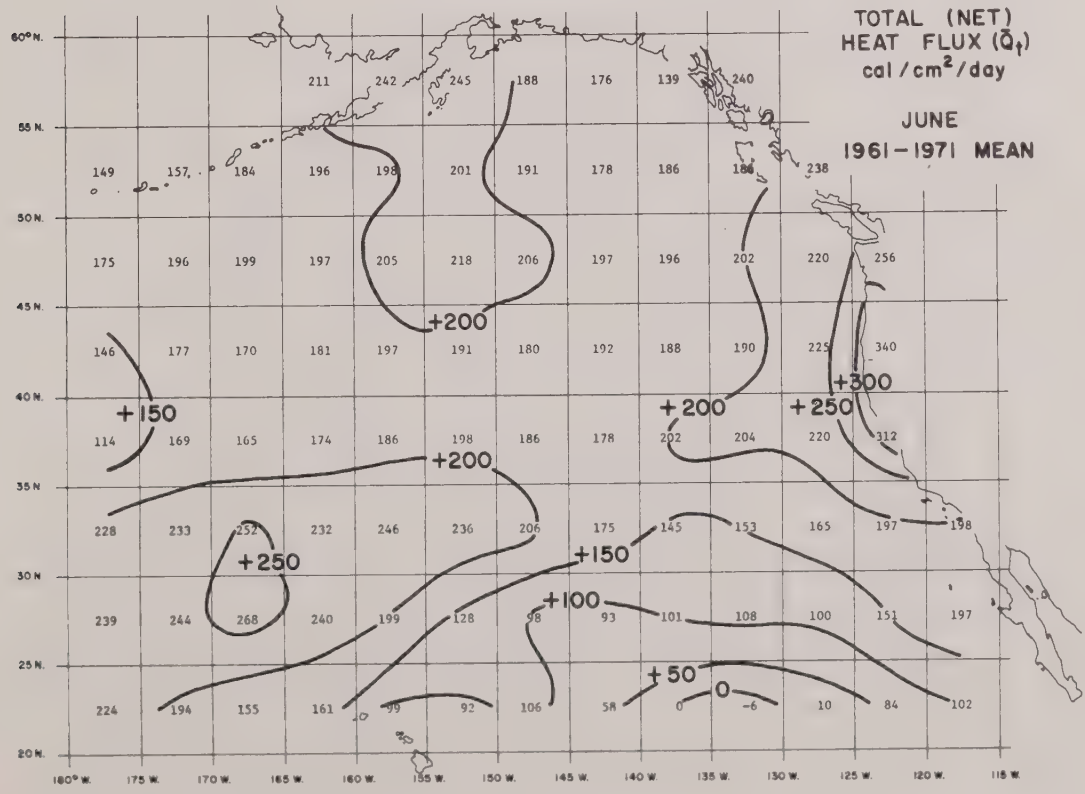


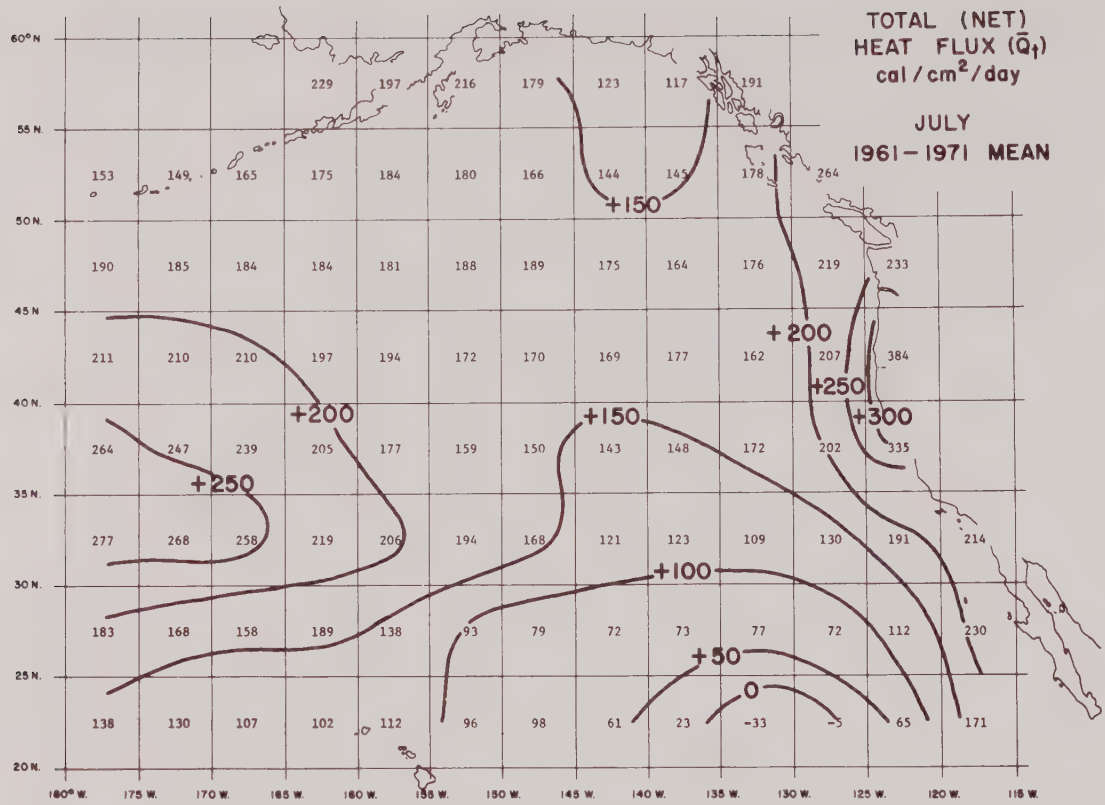


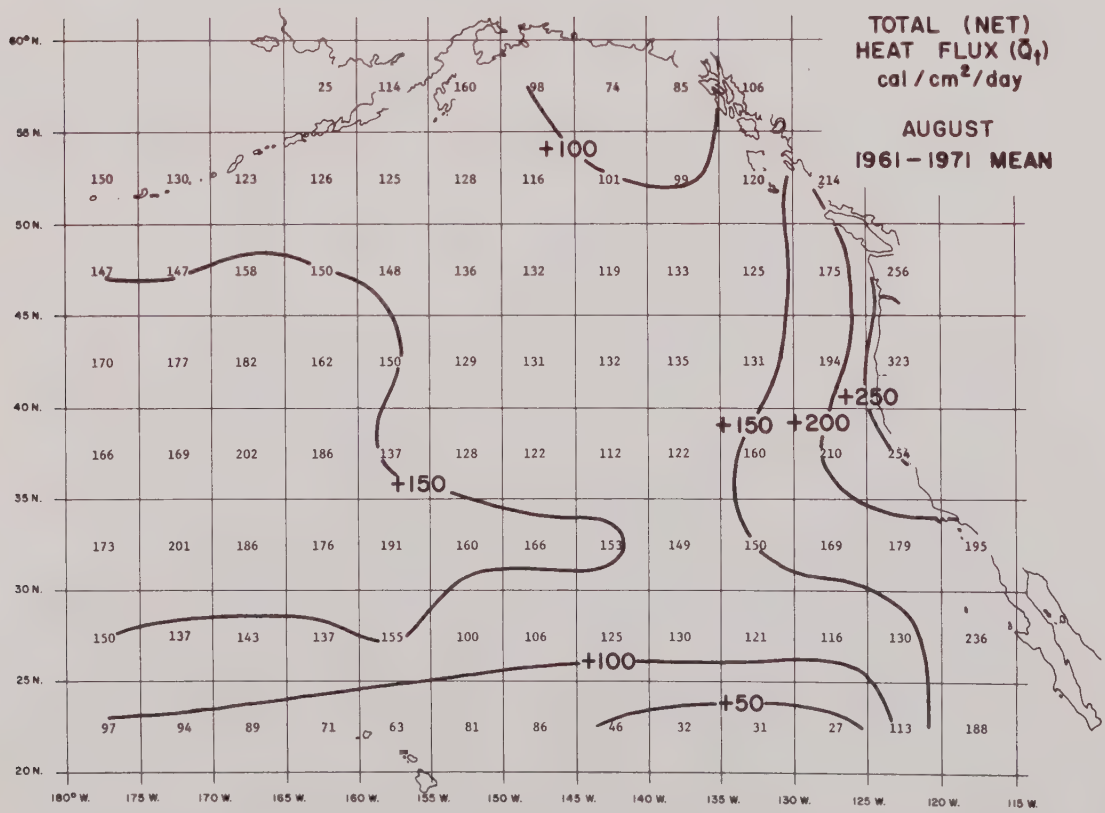

TOTAL (NET)
HEAT FLUX ($\bar{Q}_t$)
cal / cm^2 / day
MARCH
1961 – 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
85 -59 -1 -28 -49 -81 113
13 18 0 -2 20 21 19 -5 -14 -36 -150
41 46 39 45 33 20 26 28 16 8 3 16
-26 -3 10 16 2 1 4 -10 -15 -17 22 54
-49 -49 -15 -12 -10 -1 -21 -14 -6 3 35 114
15 20 31 -1 10 14 -8 -10 -18 -4 35 94 129
-5 -21 -20 -44 -50 -23 -44 -32 -12 0 -1 23 159
-19 -13 -26 -15 0 -39 -16 -34 -36 -47 -24 43 91
-50
0
0
0
0
+50
+100

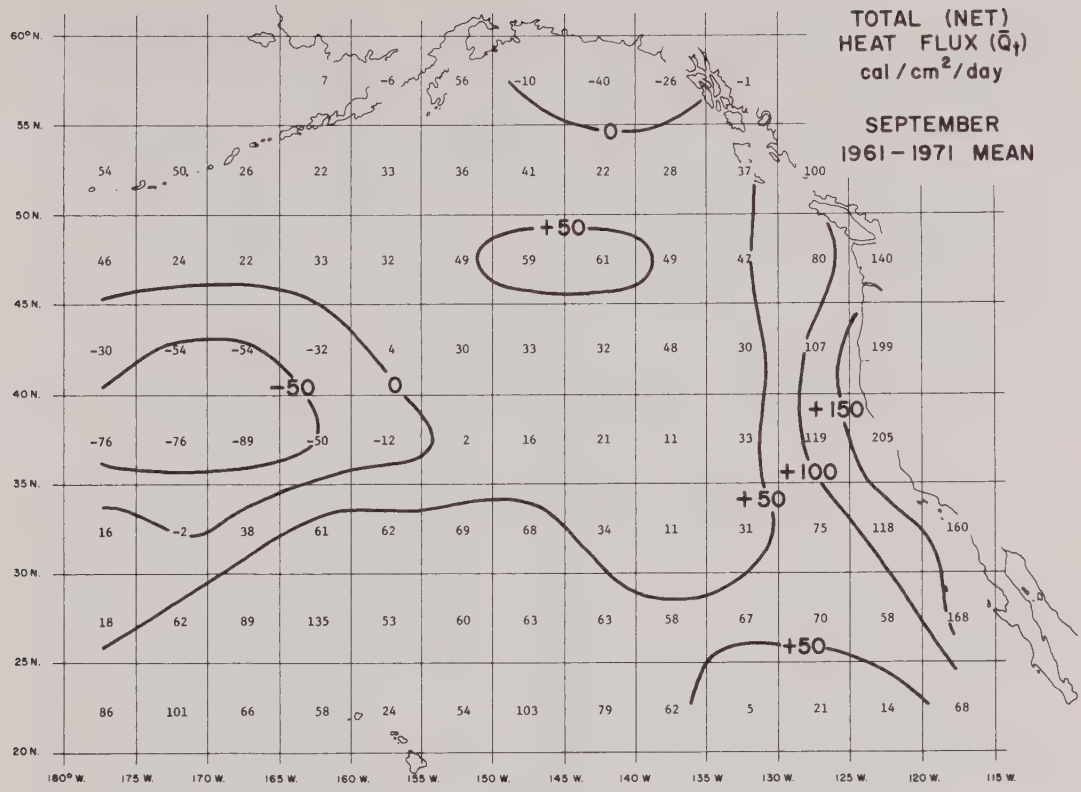

TOTAL (NET)
HEAT FLUX ($\bar{Q}_t$)
cal / cm^2 / day
APRIL
1961 – 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
128 117 121 88 68 55 35
105 103 103 118 115 116 122 104 95 68 103
138 140 128 120 124 131 122 115 118 121 132 107
65 106 93 99 98 105 71 94 71 110 102 156
75 70 83 89 62 63 63 59 53 77 114 202
82 95 103 93 108 89 80 70 46 62 90 150 215
50 62 74 67 68 5 2 13 24 46 50 103 206
42 33 14 13 7 -1 14 20 -40 -16 -23 29 64
+100
+100
+150
+50
+200
0

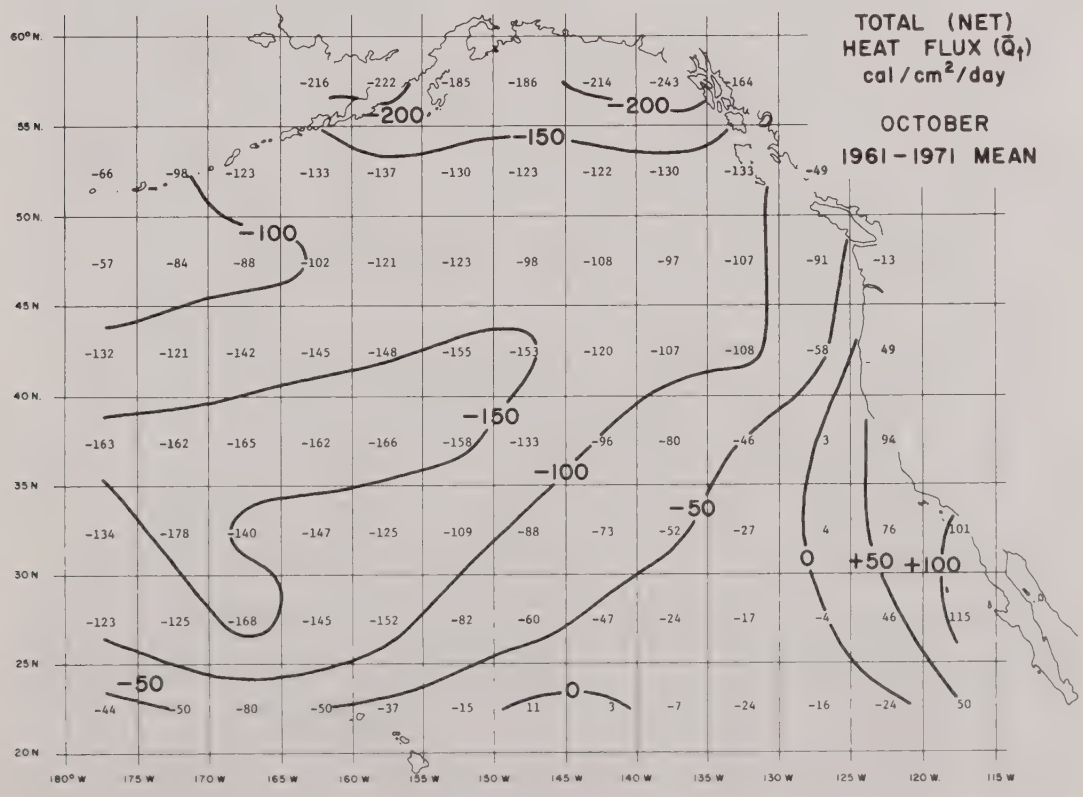

TOTAL (NET)
HEAT FLUX ($\bar{Q}_t$)
cal / cm² / day
MAY
1961 – 1971 MEAN
+200
+150
+250
+100
+50
0
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

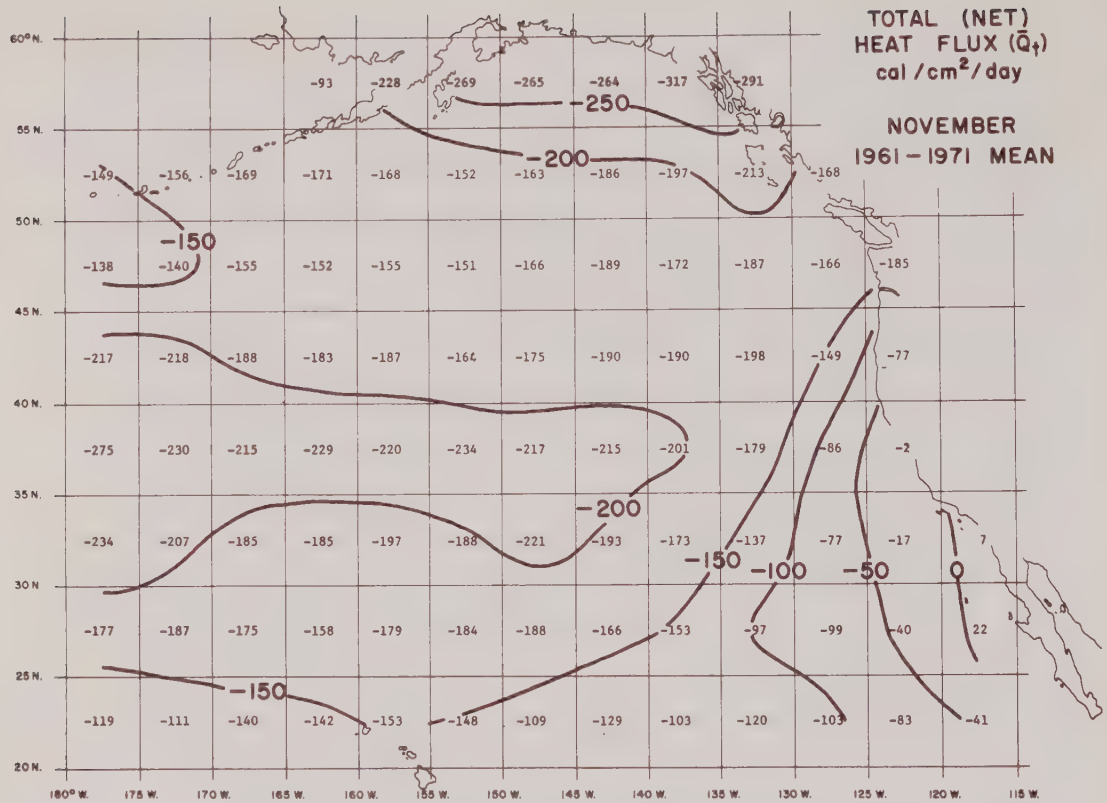

TOTAL (NET)
HEAT FLUX ($\bar{Q}_t$)
cal / cm² / day
JUNE
1961 – 1971 MEAN
+200
+150
+250
+300
+100
+50
0
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

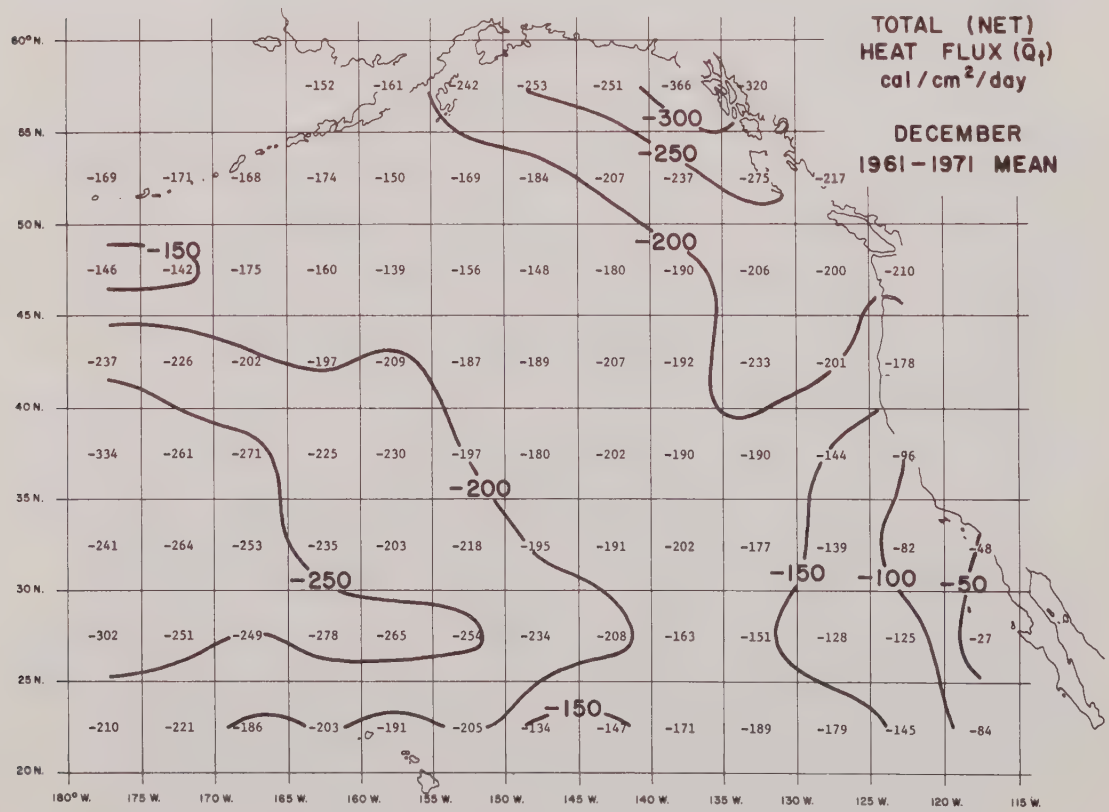

TOTAL (NET)
HEAT FLUX ($\bar{Q}_t$)
cal / cm^2 / day
JULY
1961 – 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+150
+200
+250
+300
+100
+50
0


TOTAL (NET)
HEAT FLUX ($\bar{Q}_t$)
cal / cm^2 / day
AUGUST
1961 – 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
+100
+150
+200
+250
+50

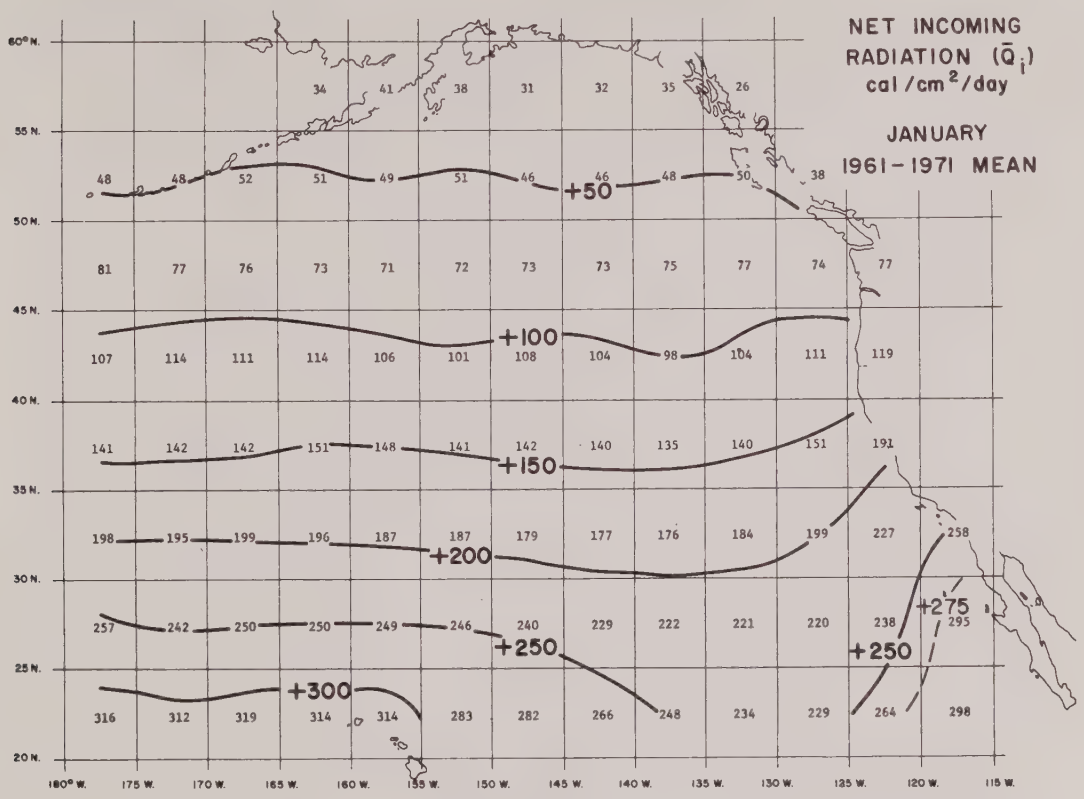

TOTAL (NET)
HEAT FLUX ($\bar{Q}_t$)
cal / cm^2 / day
SEPTEMBER
1961 – 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
7 -6 56 -10 -40 -26 -1
0
54 50 26 22 33 36 41 22 28 37 100
+50
46 24 22 33 32 49 59 61 49 47 80 140
-30 -54 -54 -32 4 30 33 32 48 30 107 199
-50
0
+150
-76 -76 -89 -50 -12 2 16 21 11 33 119 205
+100
+50
16 -2 38 61 62 69 68 34 11 31 75 118 160
18 62 89 135 53 60 63 63 58 67 70 58 168
+50
86 101 66 58 24 54 103 79 62 5 21 14 68

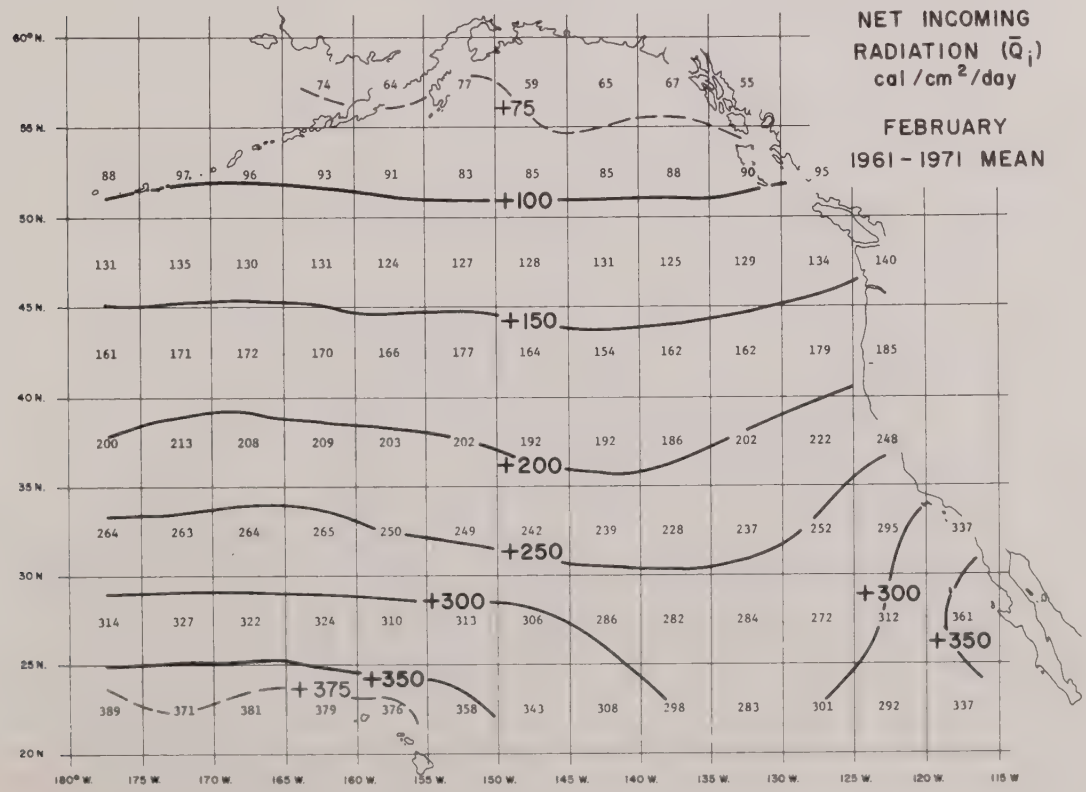

TOTAL (NET)
HEAT FLUX ($\bar{Q}_t$)
cal / cm^2 / day
OCTOBER
1961 – 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-216 -222 -185 -186 -214 -243 -164
-200
-200
-150
-66 -98 -123 -133 -137 -130 -123 -122 -130 -133 -49
-100
-57 -84 -88 -102 -121 -123 -98 -108 -97 -107 -91 -13
-132 -121 -142 -145 -148 -155 -153 -120 -107 -108 -58 49
-150
-163 -162 -165 -162 -166 -158 -133 -96 -80 -46 3 94
-100
-50
-134 -178 -140 -147 -125 -109 -88 -73 -52 -27 4 76 101
0
+50
+100
-123 -125 -168 -145 -152 -82 -60 -47 -24 -17 -4 46 115
-50
0
-44 -50 -80 -50 -37 -15 11 3 -7 -24 -16 -24 50

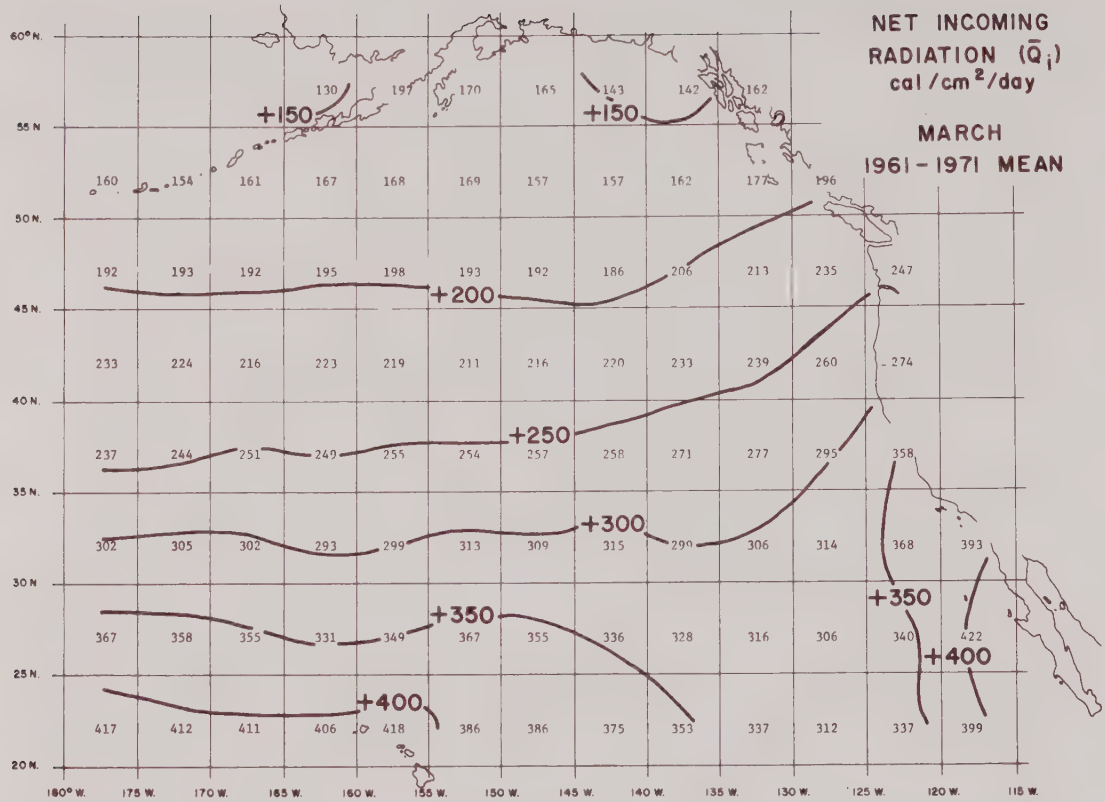

TOTAL (NET)
HEAT FLUX ($\bar{Q}_t$)
cal / cm^2 / day
NOVEMBER
1961 – 1971 MEAN
-250
-200
-150
-100
-50
0
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

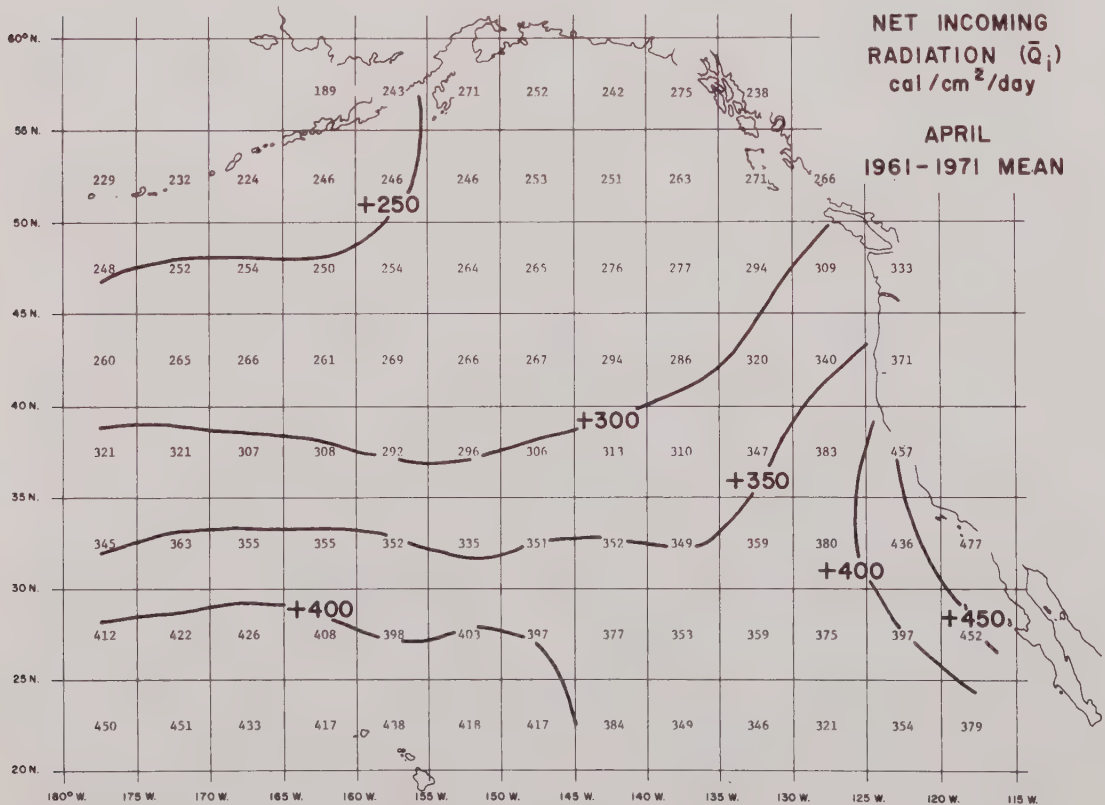

TOTAL (NET)
HEAT FLUX ($\bar{Q}_t$)
cal / cm^2 / day
DECEMBER
1961 – 1971 MEAN
-300
-250
-200
-150
-100
-50
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

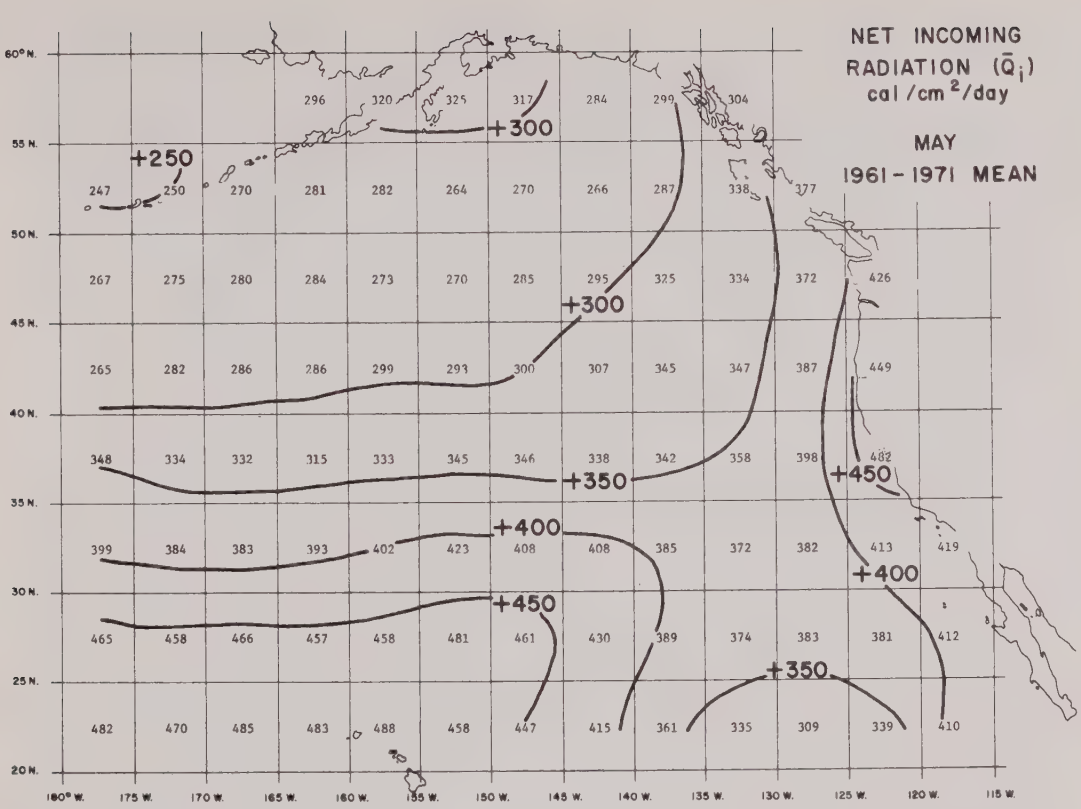
PART 3. NET INCOMING RADIATION 1961-71 MEAN MONTHLY VALUES (NORMALS).

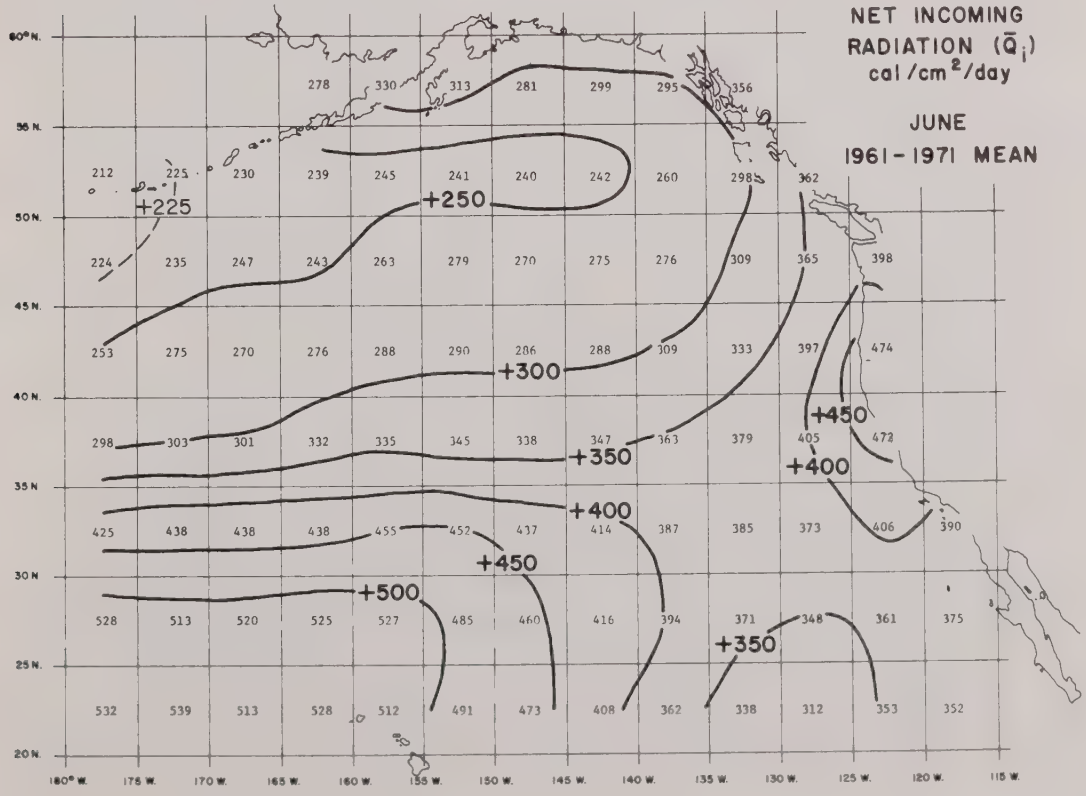


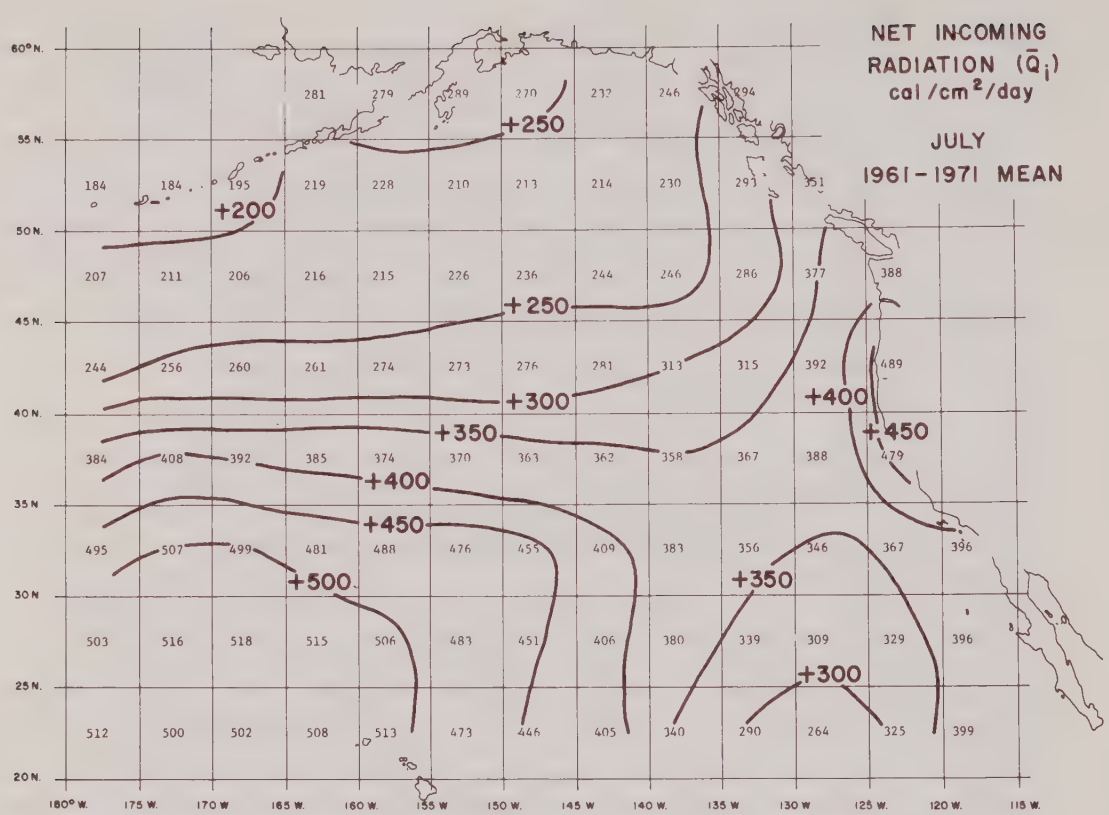


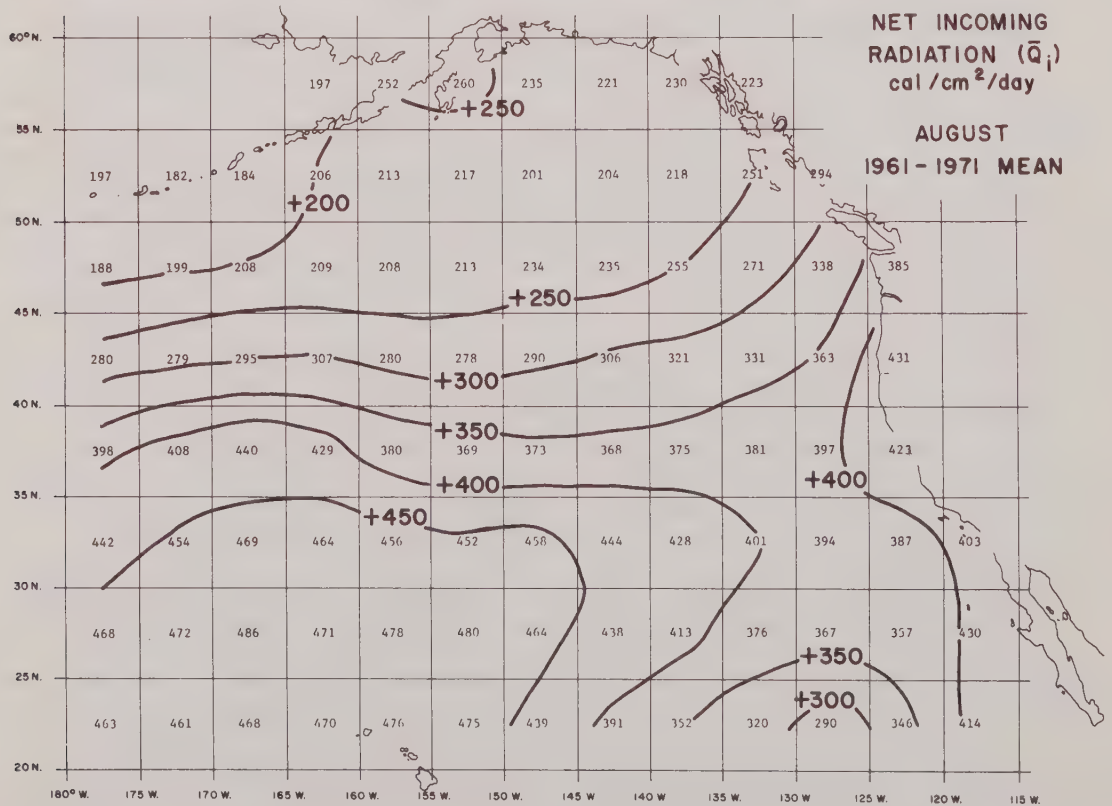

NET INCOMING
RADIATION ($\bar{Q}_i$)
cal/cm²/day
MARCH
1961 - 1971 MEAN
+150
+150
+200
+250
+300
+350
+400
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

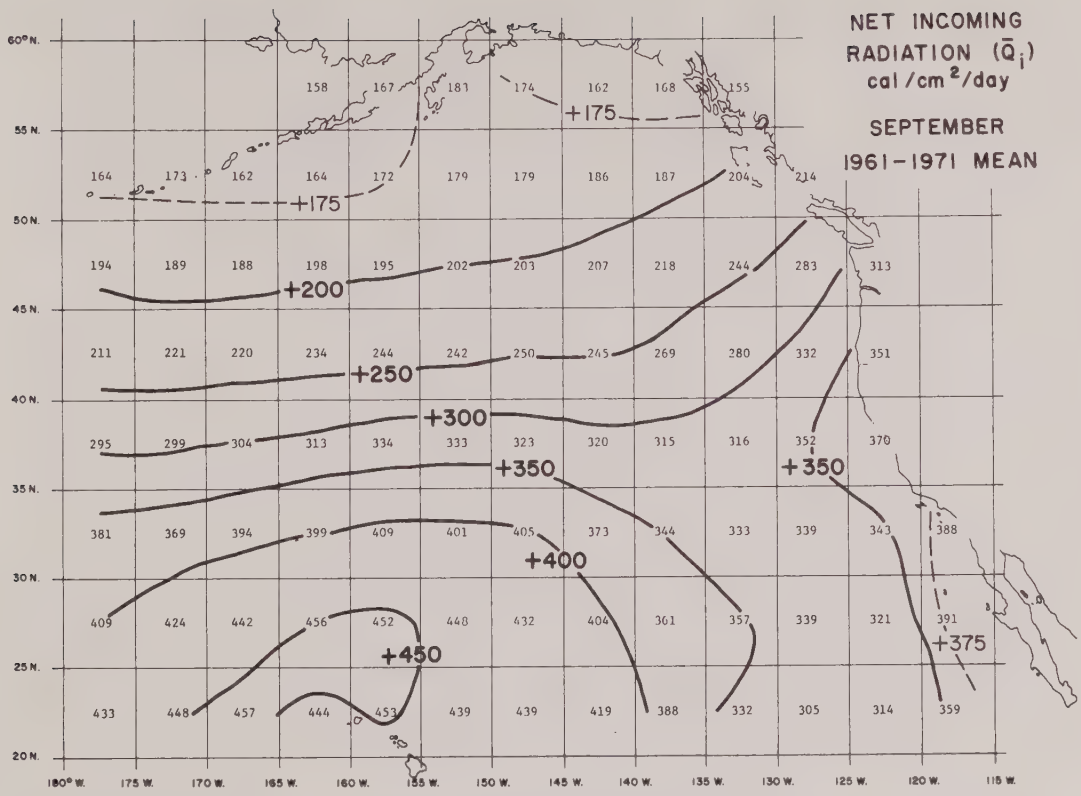

NET INCOMING
RADIATION ($\bar{Q}_i$)
cal/cm²/day
APRIL
1961 - 1971 MEAN
+250
+300
+350
+400
+450
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

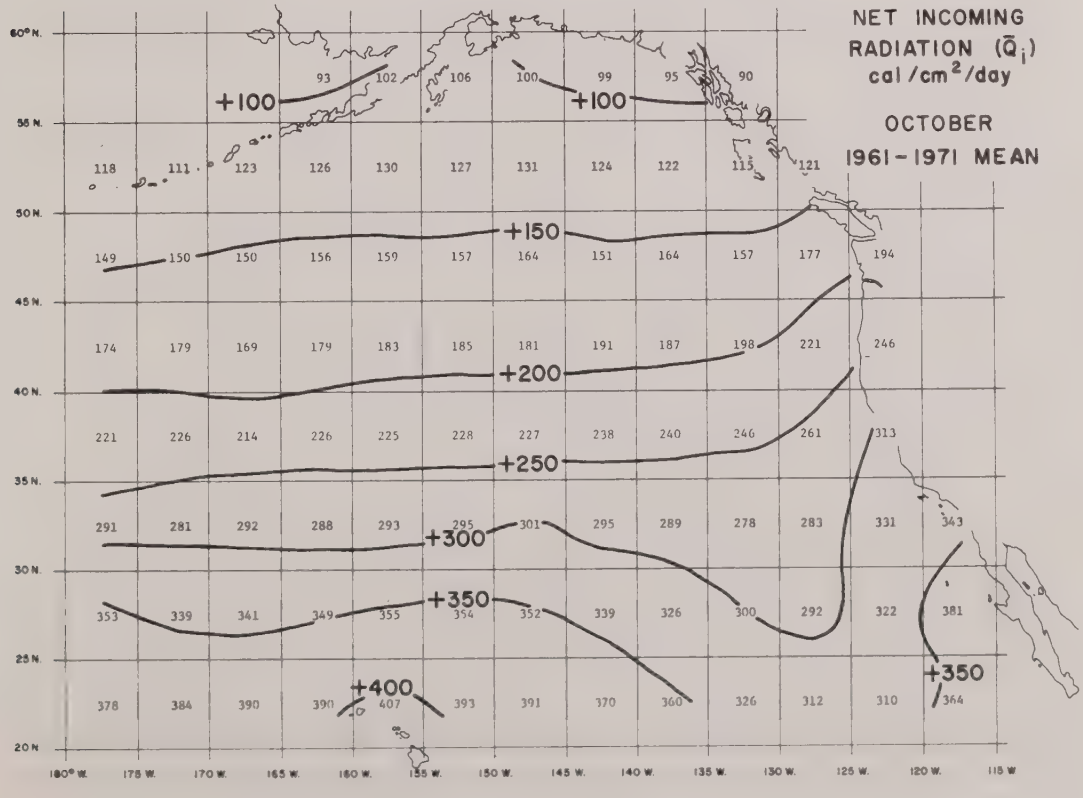

NET INCOMING
RADIATION ($\bar{Q}_i$)
cal /cm^2/day
MAY
1961 - 1971 MEAN
+250
+300
+300
+350
+400
+450
+400
+350
+450
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

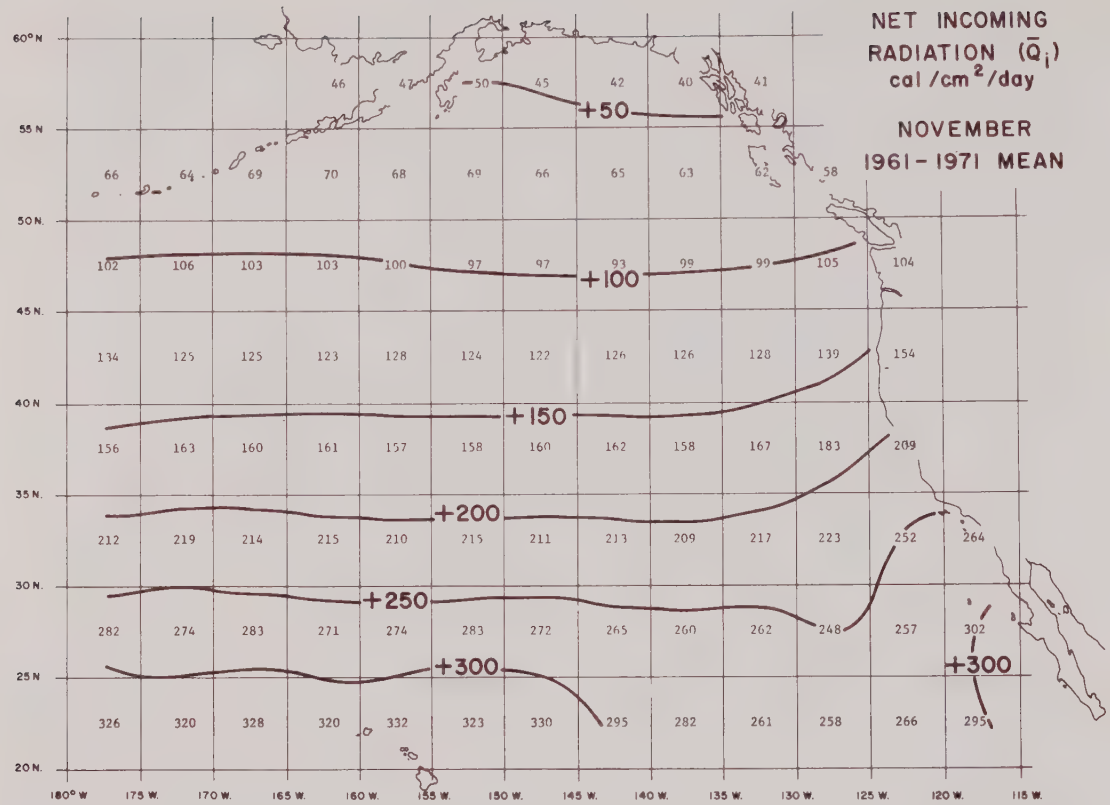

NET INCOMING
RADIATION ($\bar{Q}_i$)
cal /cm^2/day
JUNE
1961 - 1971 MEAN
+225
+250
+300
+350
+400
+450
+500
+450
+400
+350
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

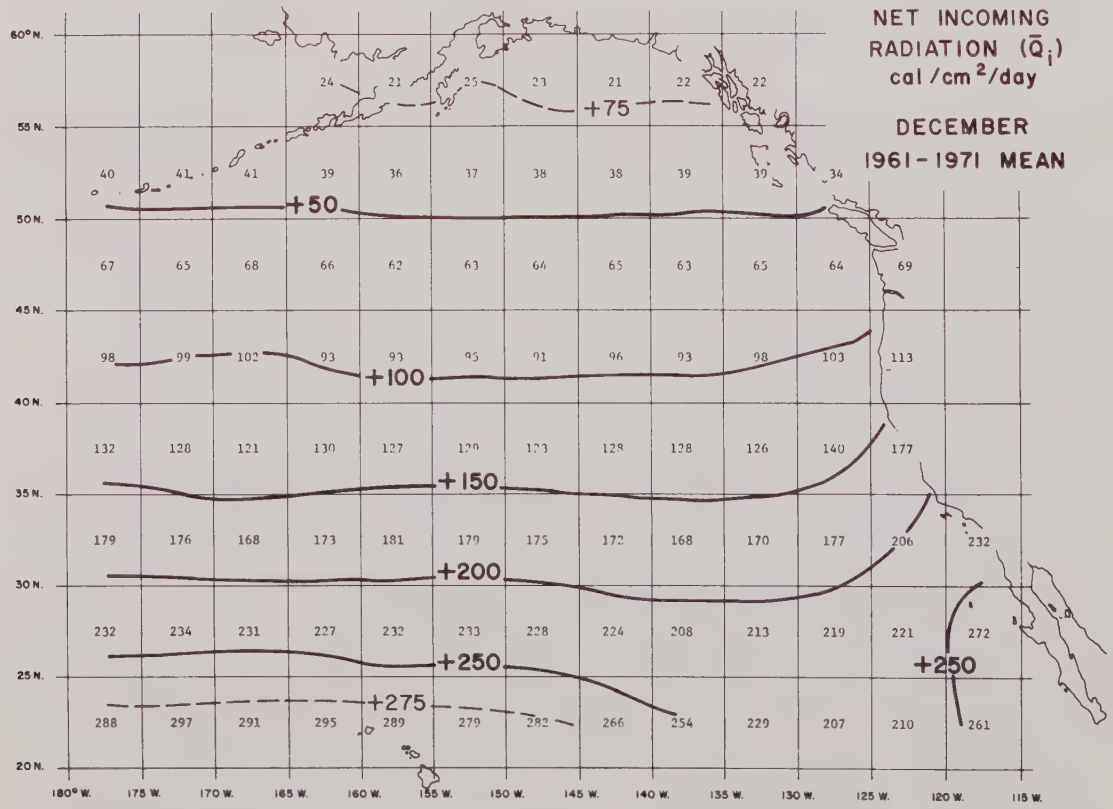

NET INCOMING RADIATION ($\bar{Q}_i$) cal/cm²/day
JULY
1961 - 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N
30 N
25 N.
20 N.
180° W.
175 W.
170 W
165 W.
160 W.
155 W
150 W.
145 W
140 W.
135 W
130 W
125 W.
120 W.
115 W.
+250
+200
+300
+350
+400
+450
+500
281 279 289 270 232 246 294
184 184 195 219 228 210 213 214 230 293 351
207 211 206 216 215 226 236 244 246 286 377 388
244 256 260 261 274 273 276 281 313 315 392 489
384 408 392 385 374 370 363 362 358 367 388 479
495 507 499 481 488 476 455 409 383 356 346 367 396
503 516 518 515 506 483 451 406 380 339 309 329 396
512 500 502 508 513 473 446 405 340 290 264 325 399


NET INCOMING RADIATION ($\bar{Q}_i$) cal/cm²/day
AUGUST
1961 - 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W
140 W
135 W.
130 W
125 W.
120 W.
115 W.
+250
+200
+300
+350
+400
+450
197 252 260 235 221 230 223
197 182 184 206 213 217 201 204 218 251 294
188 199 208 209 208 213 234 235 255 271 338 385
280 279 295 307 280 278 290 306 321 331 363 431
398 408 440 429 380 369 373 368 375 381 397 423
442 454 469 464 456 452 458 444 428 401 394 387 403
468 472 486 471 478 480 464 438 413 376 367 357 430
463 461 468 470 476 475 439 391 352 320 290 346 414

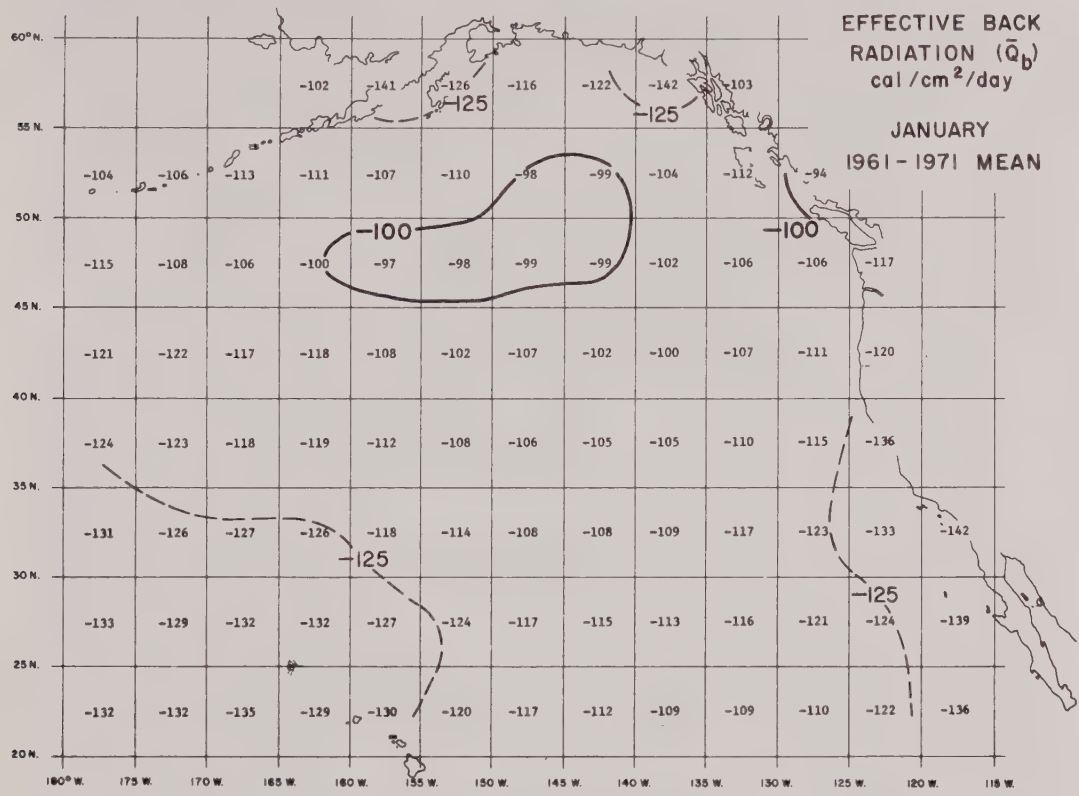

NET INCOMING RADIATION ($\bar{Q}_i$) cal/cm^2/day
SEPTEMBER
1961-1971 MEAN
+175
+200
+250
+300
+350
+400
+450
+375
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

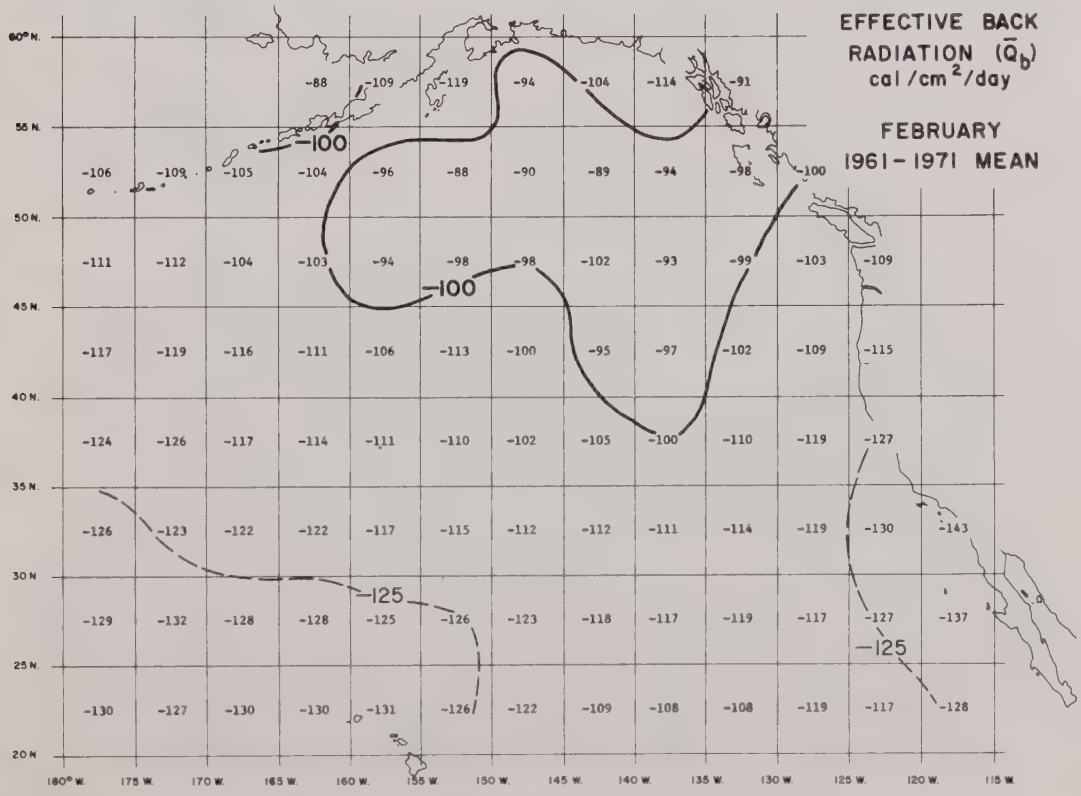

NET INCOMING RADIATION ($\bar{Q}_i$) cal/cm^2/day
OCTOBER
1961-1971 MEAN
+100
+150
+200
+250
+300
+350
+400
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

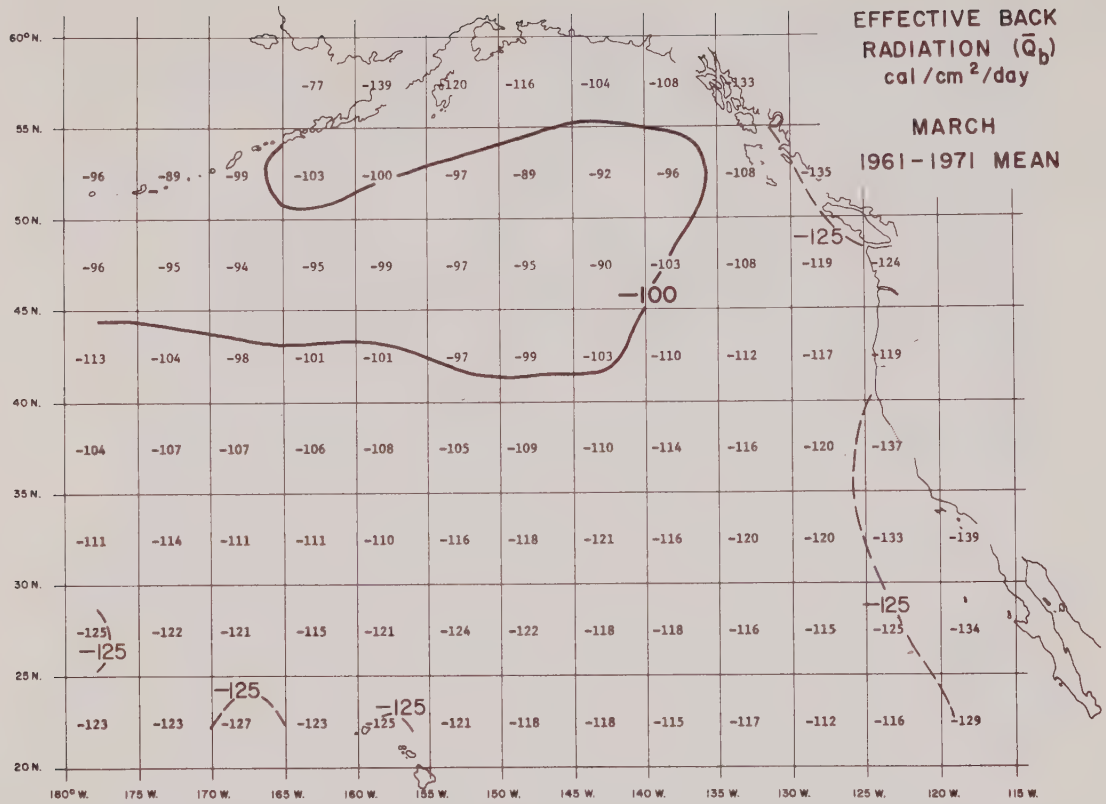

NET INCOMING
RADIATION ($\bar{Q}_i$)
cal /cm^2/day
NOVEMBER
1961 - 1971 MEAN
+50
+100
+150
+200
+250
+300
60° N
55 N
50 N.
45 N.
40 N
35 N.
30 N.
25 N
20 N.
180° W
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

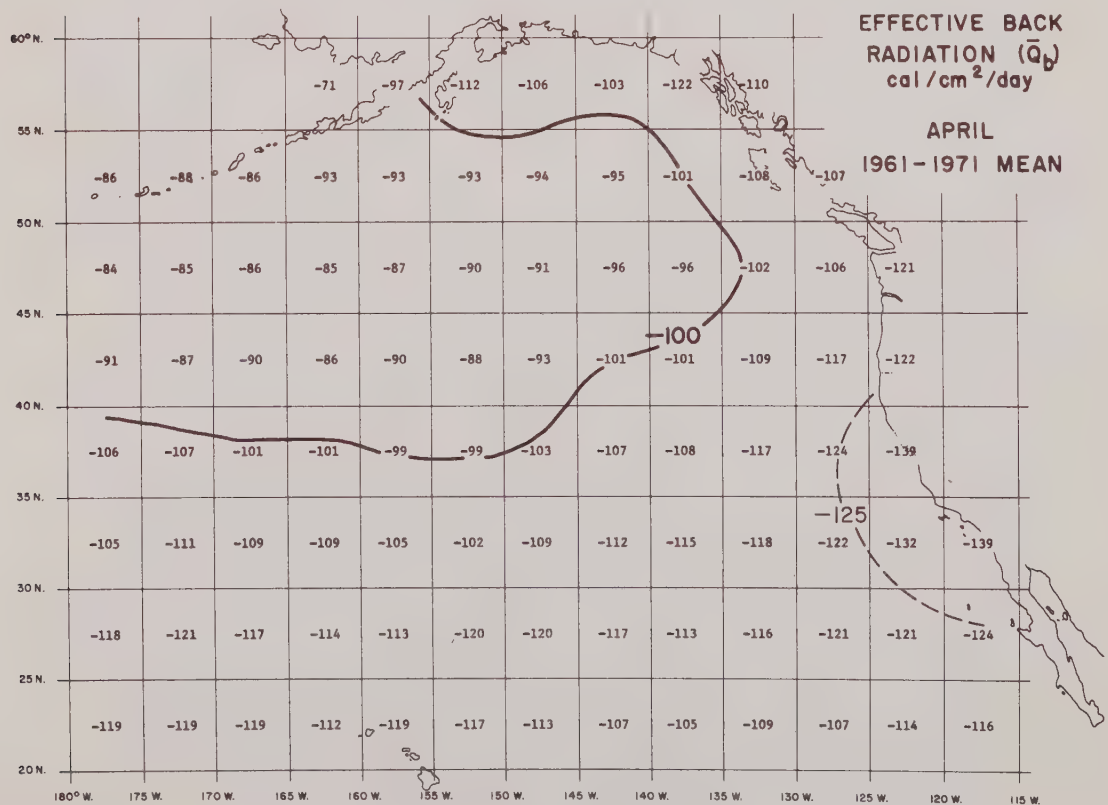

NET INCOMING
RADIATION ($\bar{Q}_i$)
cal /cm^2/day
DECEMBER
1961 - 1971 MEAN
+75
+50
+100
+150
+200
+250
+275
+300
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

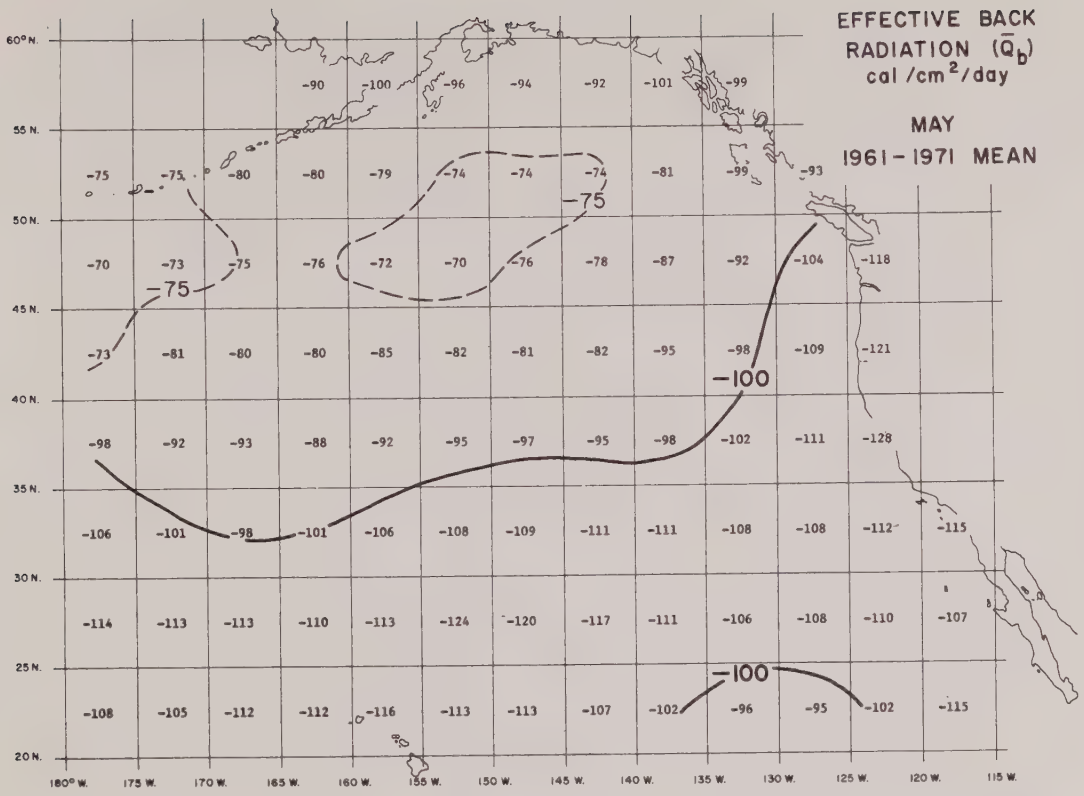
PART 4. EFFECTIVE BACK RADIATION 1961-71 MEAN MONTHLY VALUES (NORMALS).

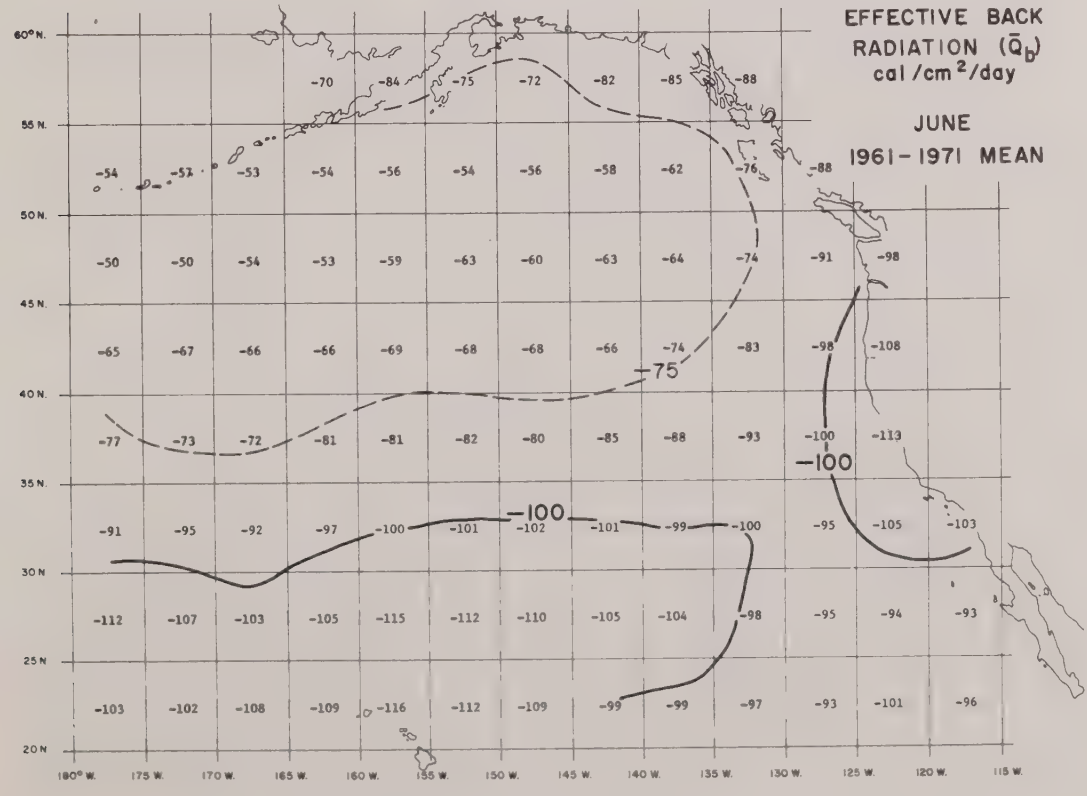


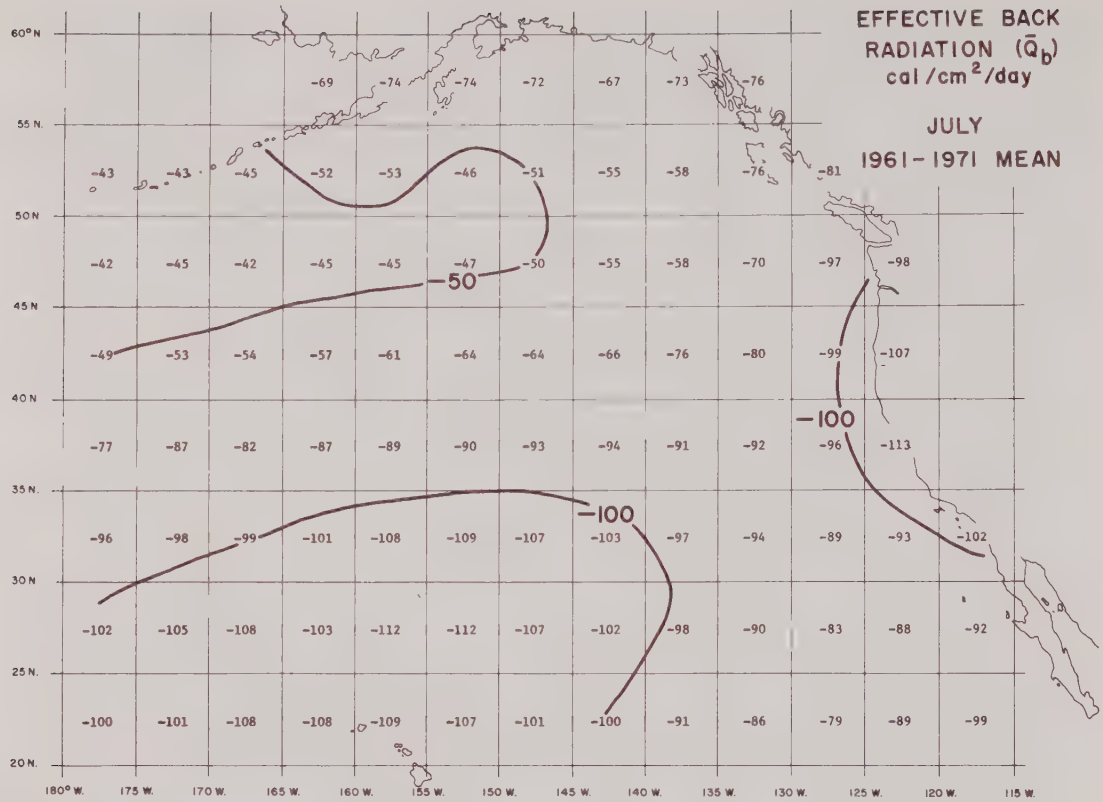


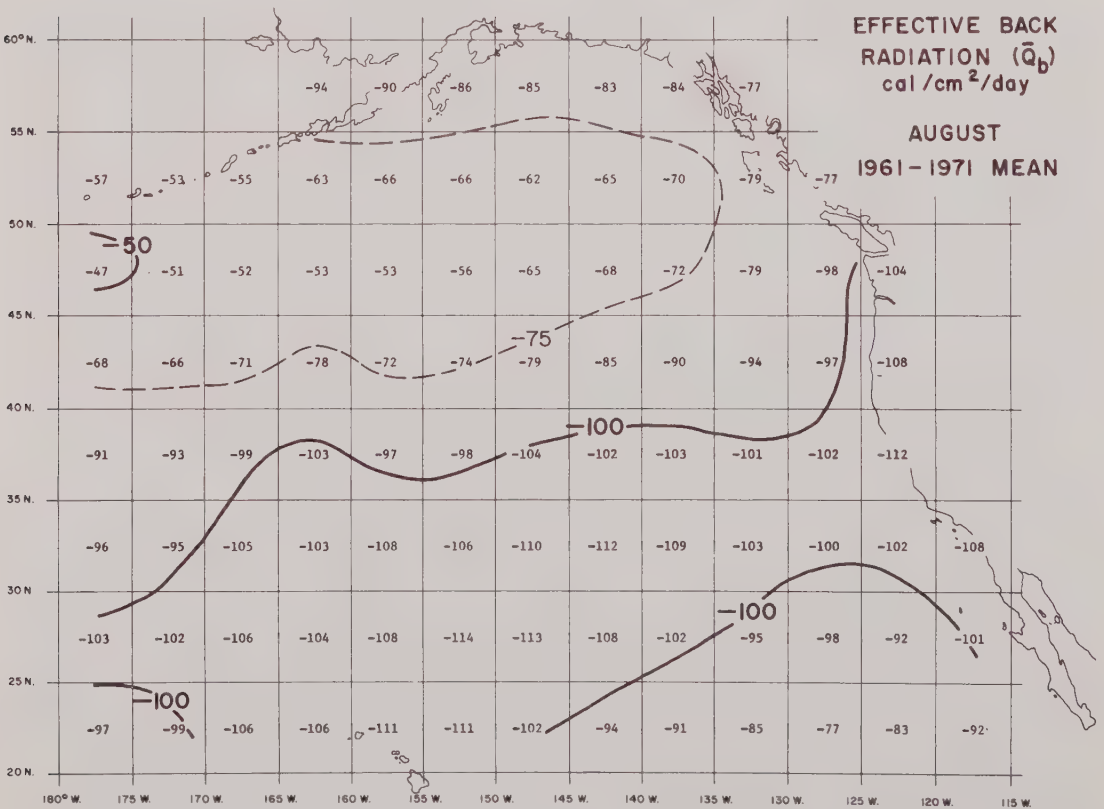

EFFECTIVE BACK RADIATION ($\bar{Q}_b$) cal/cm²/day
MARCH
1961-1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-77 -139 -120 -116 -104 -108 -133
-96 -89 -99 -103 -100 -97 -89 -92 -96 -108 -135
-96 -95 -94 -95 -99 -97 -95 -90 -103 -108 -119 -124
-113 -104 -98 -101 -101 -97 -99 -103 -110 -112 -117 -119
-104 -107 -107 -106 -108 -105 -109 -110 -114 -116 -120 -137
-111 -114 -111 -111 -110 -116 -118 -121 -116 -120 -120 -133 -139
-125 -122 -121 -115 -121 -124 -122 -118 -118 -116 -115 -125 -134
-123 -123 -127 -123 -125 -121 -118 -118 -115 -117 -112 -116 -129
-125
-100
-125
-125
-125
-125

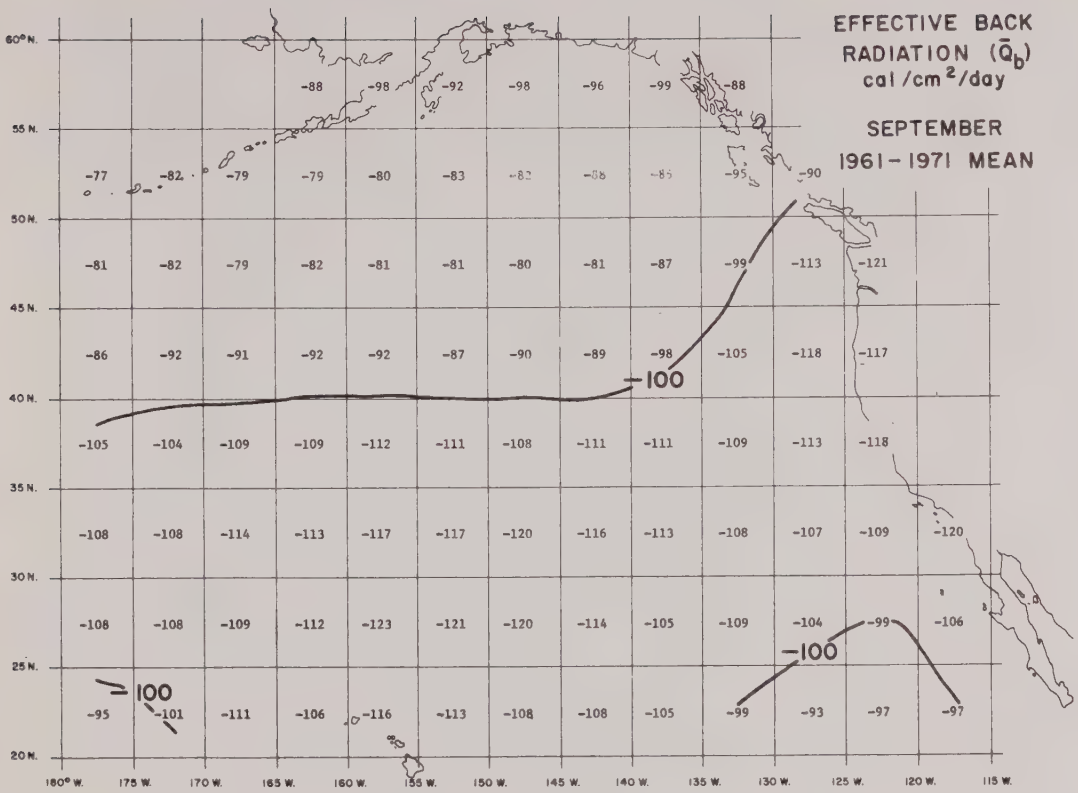

EFFECTIVE BACK RADIATION ($\bar{Q}_b$) cal/cm²/day
APRIL
1961-1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-71 -97 -112 -106 -103 -122 -110
-86 -88 -86 -93 -93 -93 -94 -95 -101 -108 -107
-84 -85 -86 -85 -87 -90 -91 -96 -96 -102 -106 -121
-91 -87 -90 -86 -90 -88 -93 -101 -101 -109 -117 -122
-106 -107 -101 -101 -99 -99 -103 -107 -108 -117 -124 -139
-105 -111 -109 -109 -105 -102 -109 -112 -115 -118 -122 -132 -139
-118 -121 -117 -114 -113 -120 -120 -117 -113 -116 -121 -121 -124
-119 -119 -119 -112 -119 -117 -113 -107 -105 -109 -107 -114 -116
-100
-125

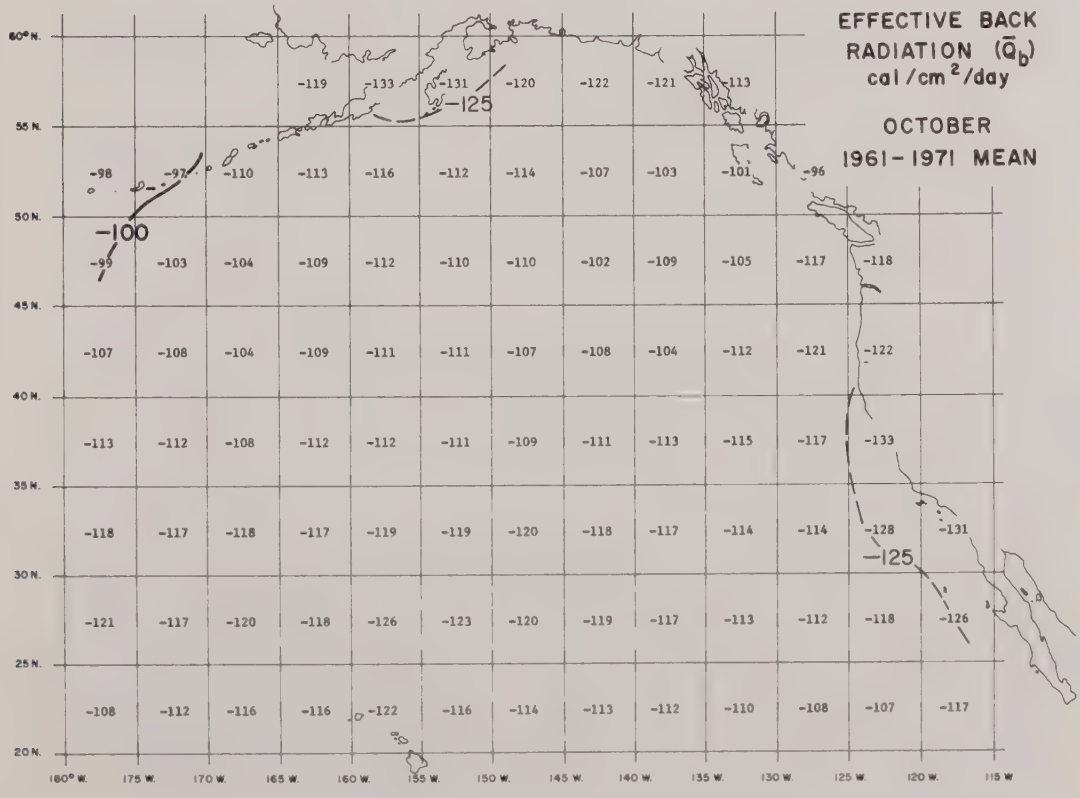

EFFECTIVE BACK RADIATION ($\bar{Q}_b$) cal /cm^2/day
MAY
1961 - 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-75
-100

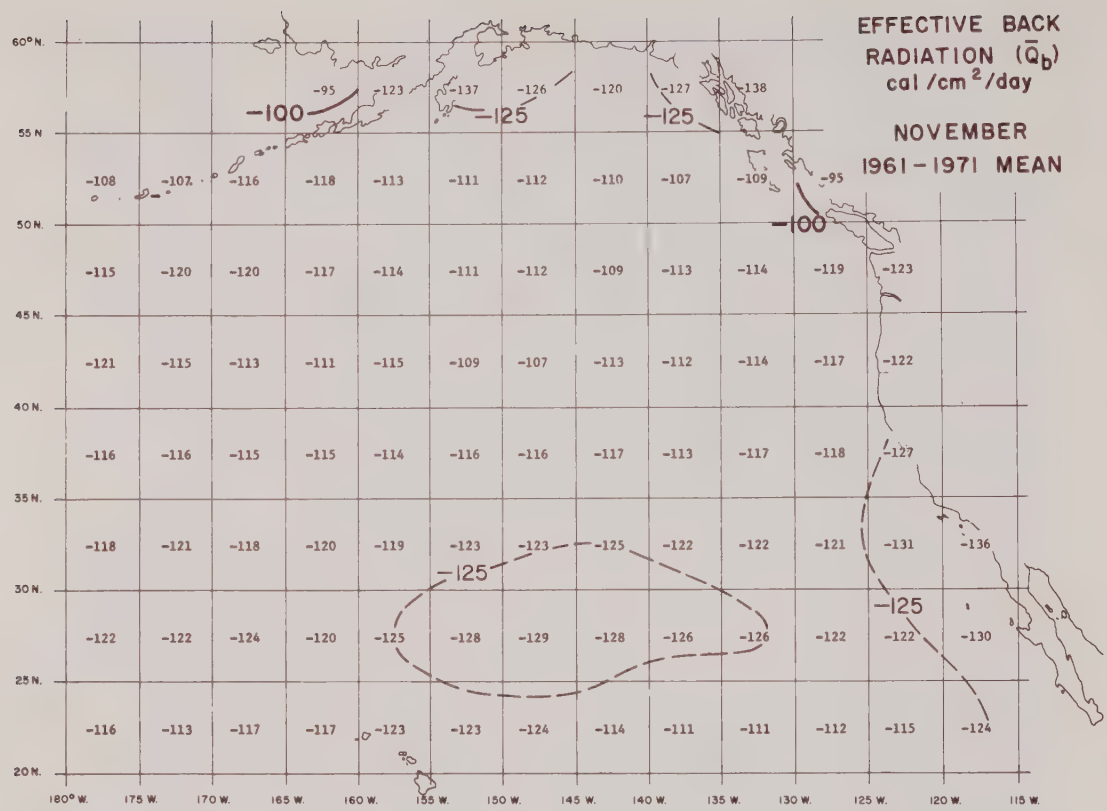

EFFECTIVE BACK RADIATION ($\bar{Q}_b$) cal /cm^2/day
JUNE
1961 - 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-75
-100

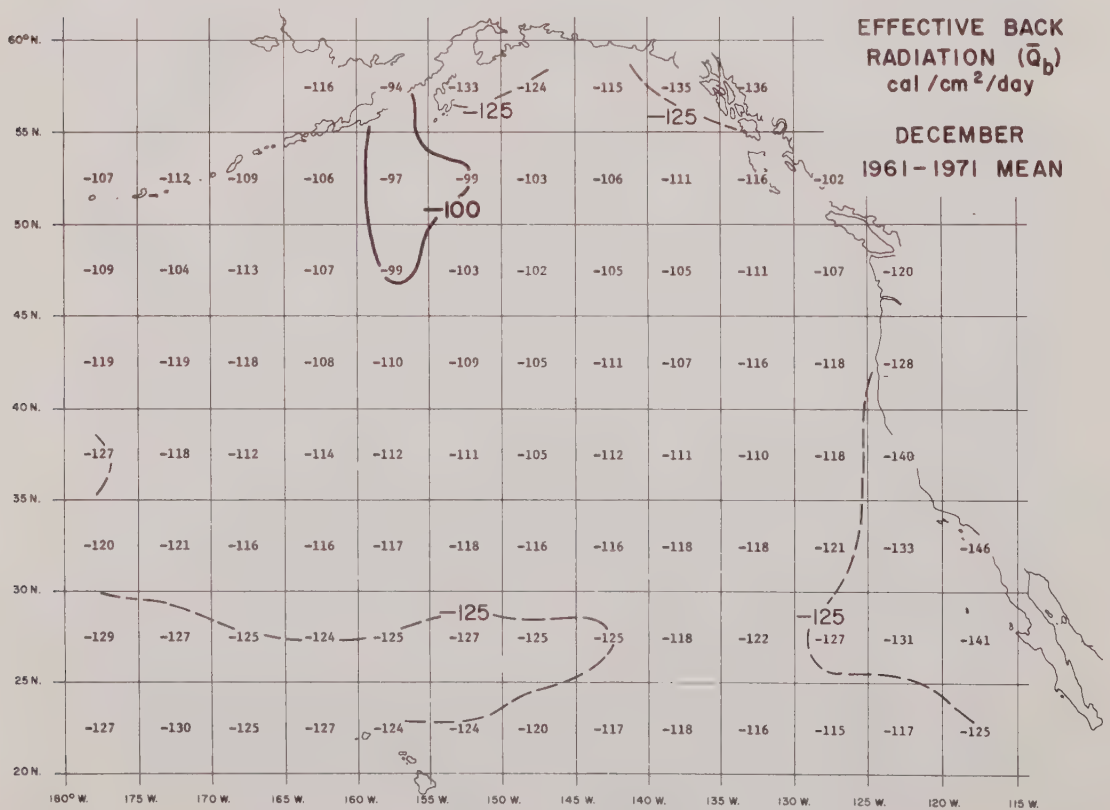

EFFECTIVE BACK RADIATION ($\bar{Q}_b$) cal/cm^2/day
JULY
1961 - 1971 MEAN
60° N
55 N.
50 N
45 N
40 N
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-50
-100
-69 -74 -74 -72 -67 -73 -76
-43 -43 -45 -52 -53 -46 -51 -55 -58 -76 -81
-42 -45 -42 -45 -45 -47 -50 -55 -58 -70 -97 -98
-49 -53 -54 -57 -61 -64 -64 -66 -76 -80 -99 -107
-77 -87 -82 -87 -89 -90 -93 -94 -91 -92 -96 -113
-96 -98 -99 -101 -108 -109 -107 -103 -97 -94 -89 -93 -102
-102 -105 -108 -103 -112 -112 -107 -102 -98 -90 -83 -88 -92
-100 -101 -108 -108 -109 -107 -101 -100 -91 -86 -79 -89 -99


EFFECTIVE BACK RADIATION ($\bar{Q}_b$) cal/cm^2/day
AUGUST
1961 - 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-50
-75
-100
-94 -90 -86 -85 -83 -84 -77
-57 -53 -55 -63 -66 -66 -62 -65 -70 -79 -77
-47 -51 -52 -53 -53 -56 -65 -68 -72 -79 -98 -104
-68 -66 -71 -78 -72 -74 -79 -85 -90 -94 -97 -108
-91 -93 -99 -103 -97 -98 -104 -102 -103 -101 -102 -112
-96 -95 -105 -103 -108 -106 -110 -112 -109 -103 -100 -102 -108
-103 -102 -106 -104 -108 -114 -113 -108 -102 -95 -98 -92 -101
-97 -99 -106 -106 -111 -111 -102 -94 -91 -85 -77 -83 -92

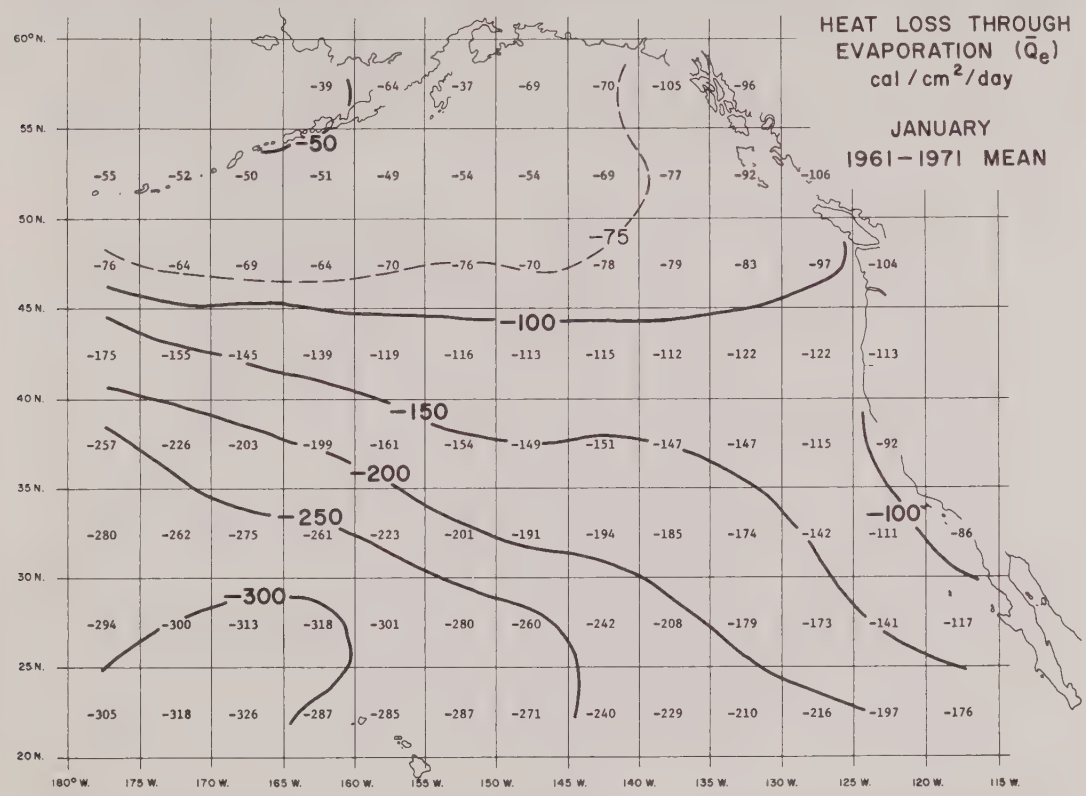

EFFECTIVE BACK RADIATION ($\bar{Q}_b$) cal/cm²/day
SEPTEMBER
1961 - 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-88 -98 -92 -98 -96 -99 -88
-77 -82 -79 -79 -80 -83 -82 -88 -85 -95 -90
-81 -82 -79 -82 -81 -81 -80 -81 -87 -99 -113 -121
-86 -92 -91 -92 -92 -87 -90 -89 -98 -105 -118 -117
-100
-105 -104 -109 -109 -112 -111 -108 -111 -111 -109 -113 -118
-108 -108 -114 -113 -117 -117 -120 -116 -113 -108 -107 -109 -120
-108 -108 -109 -112 -123 -121 -120 -114 -105 -109 -104 -99 -106
-100
-100
-95 -101 -111 -106 -116 -113 -108 -108 -105 -99 -93 -97 -97

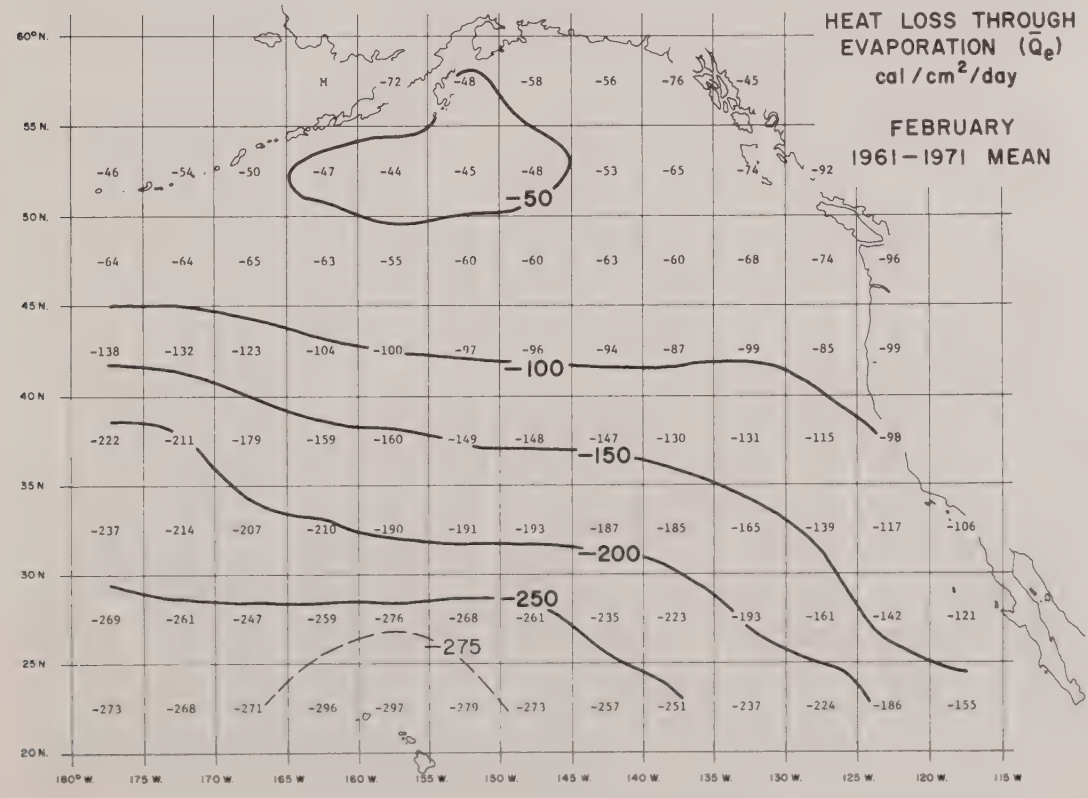

EFFECTIVE BACK RADIATION ($\bar{Q}_b$) cal/cm²/day
OCTOBER
1961 - 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-119 -133 -131 -120 -122 -121 -113
-125
-98 -97 -110 -113 -116 -112 -114 -107 -103 -101 -96
-100
-99 -103 -104 -109 -112 -110 -110 -102 -109 -105 -117 -118
-107 -108 -104 -109 -111 -111 -107 -108 -104 -112 -121 -122
-113 -112 -108 -112 -112 -111 -109 -111 -113 -115 -117 -133
-118 -117 -118 -117 -119 -119 -120 -118 -117 -114 -114 -128 -131
-125
-121 -117 -120 -118 -126 -123 -120 -119 -117 -113 -112 -118 -126
-108 -112 -116 -116 -122 -116 -114 -113 -112 -110 -108 -107 -117

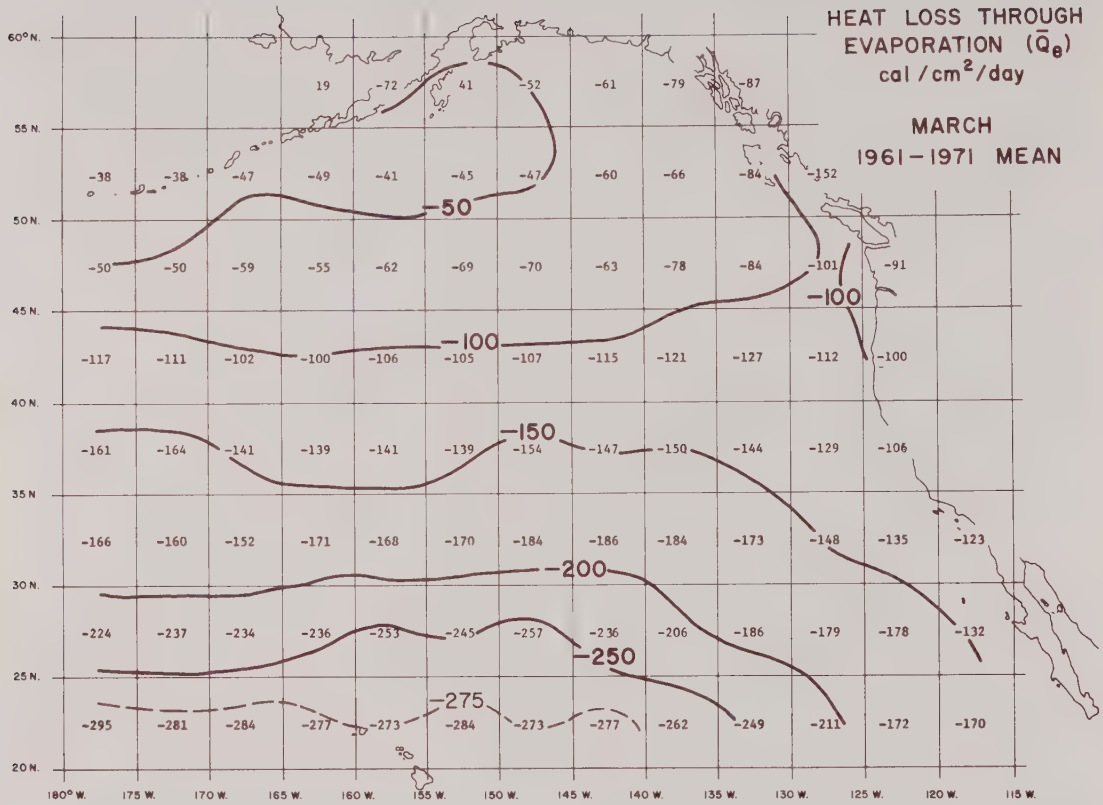

EFFECTIVE BACK RADIATION ($\bar{Q}_b$) cal /cm^2/day
NOVEMBER
1961 - 1971 MEAN
-100
-125
-125
-100
-125
-125
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

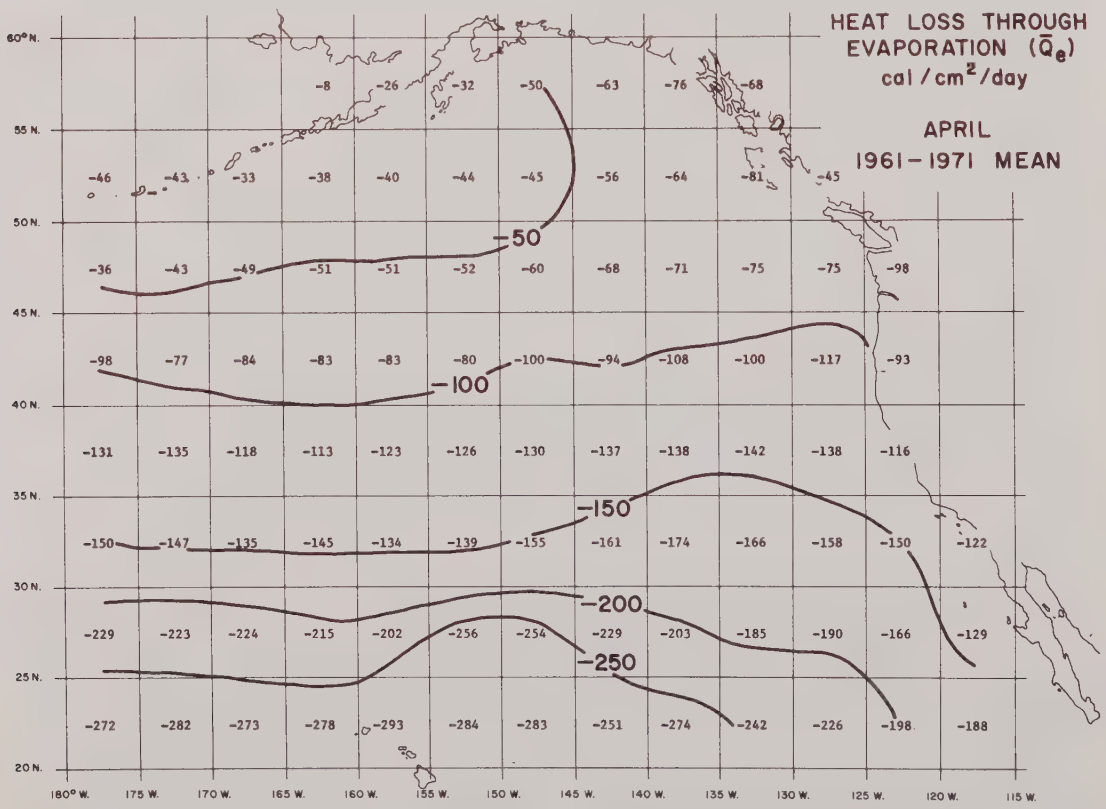

EFFECTIVE BACK RADIATION ($\bar{Q}_b$) cal /cm^2/day
DECEMBER
1961 - 1971 MEAN
-125
-125
-100
-125
-125
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

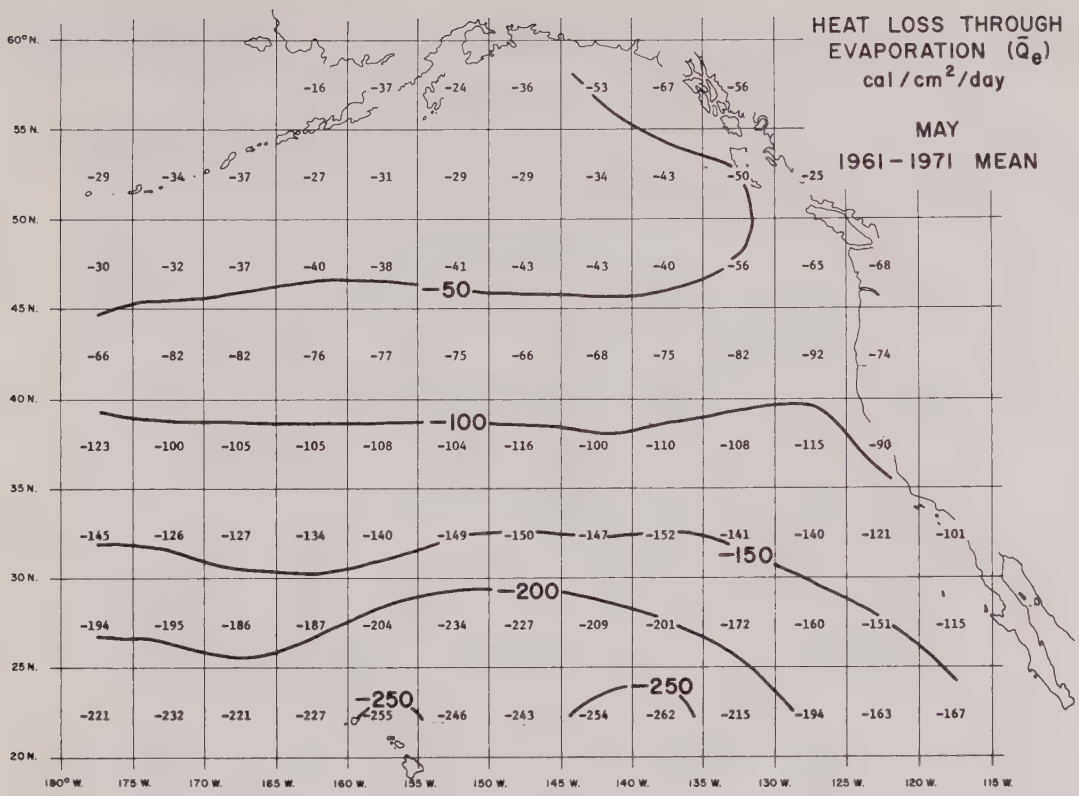
PART 5. EVAPORATIVE HEAT FLUX 1961-71 MEAN MONTHLY VALUES (NORMALS).

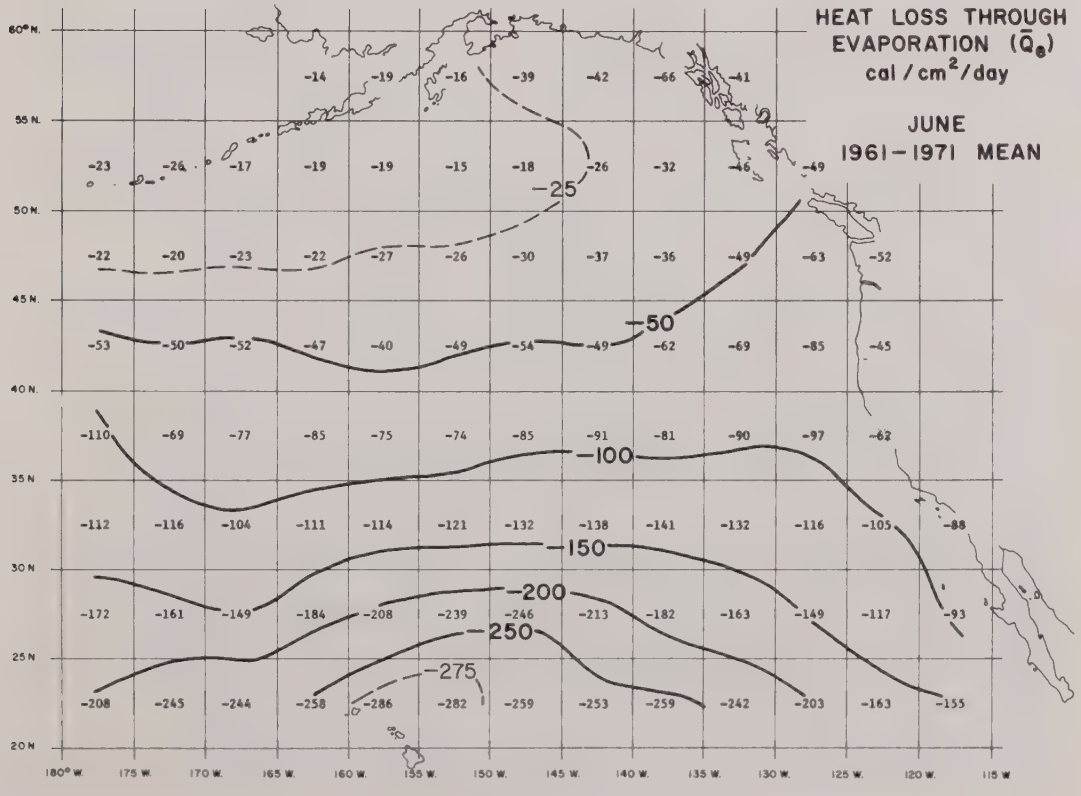


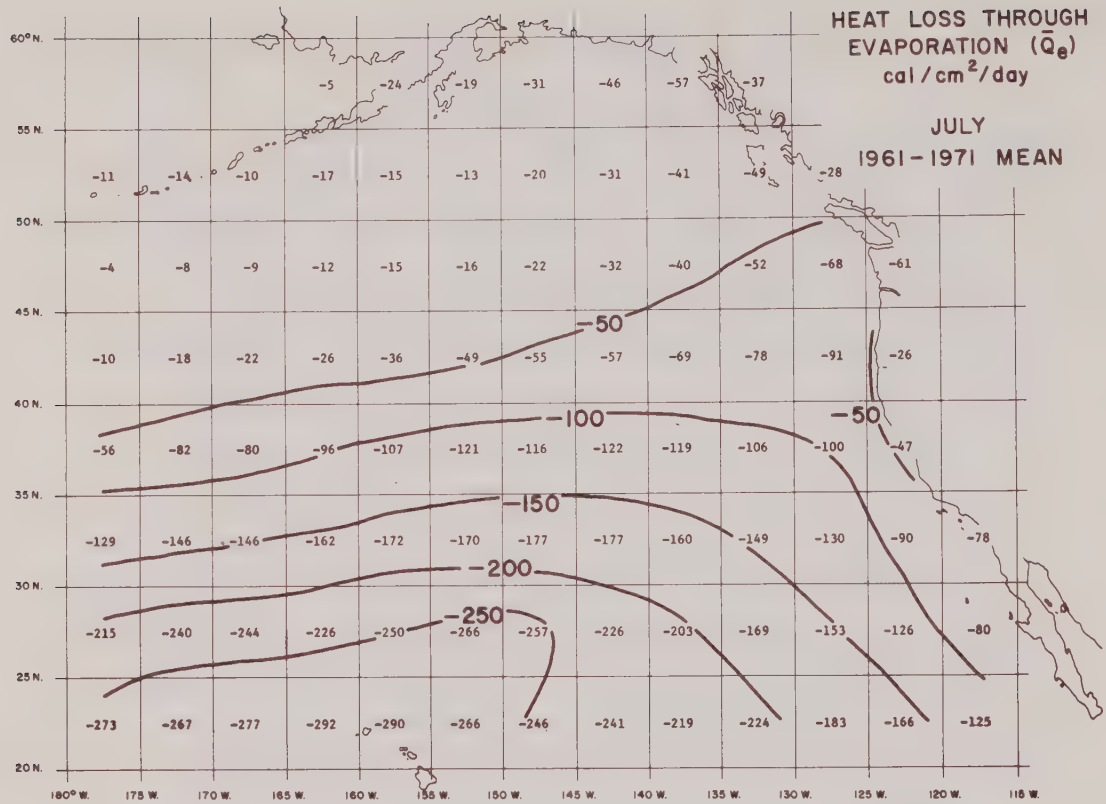


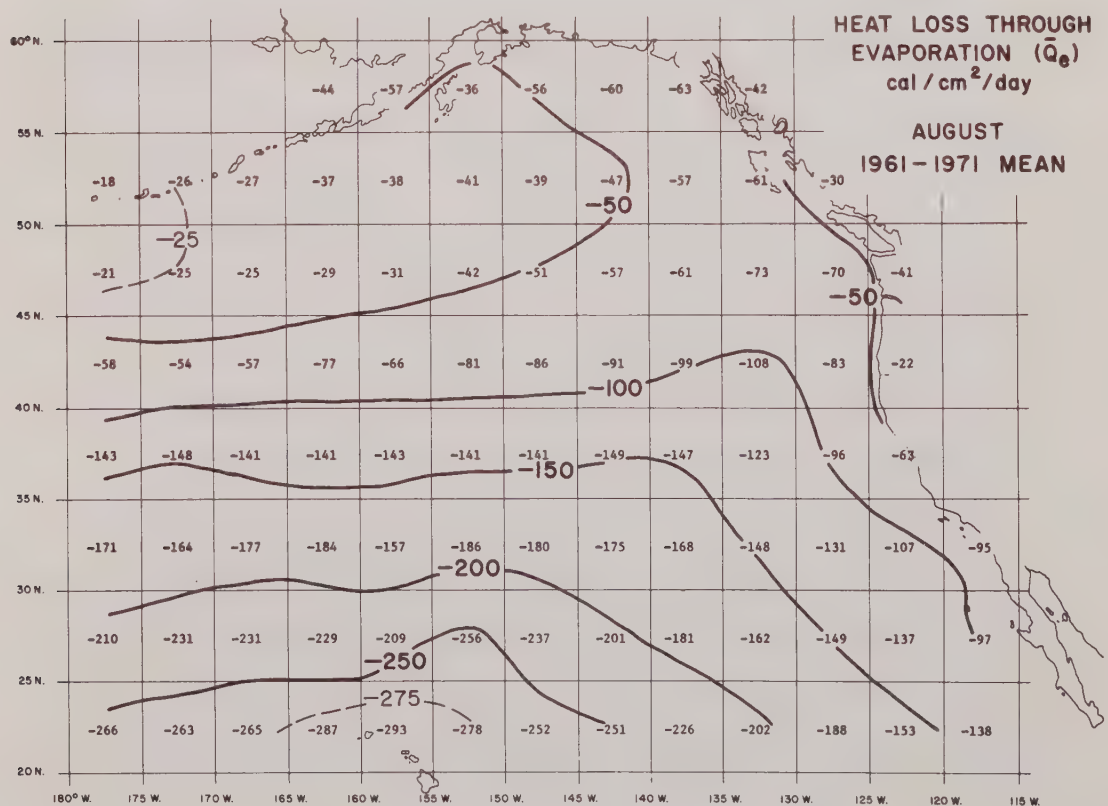

HEAT LOSS THROUGH EVAPORATION ($\bar{Q}_e$)
cal / cm^2/day
MARCH
1961 – 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-50
-100
-150
-200
-250
-275


HEAT LOSS THROUGH EVAPORATION ($\bar{Q}_e$)
cal / cm^2/day
APRIL
1961 – 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-50
-100
-150
-200
-250


HEAT LOSS THROUGH EVAPORATION ($\bar{Q}_e$)
cal / cm^2 / day
MAY
1961 – 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-50
-100
-150
-200
-250


HEAT LOSS THROUGH EVAPORATION ($\bar{Q}_e$)
cal / cm^2 / day
JUNE
1961 – 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N
30 N
25 N
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W
-25
-50
-100
-150
-200
-250
-275


HEAT LOSS THROUGH EVAPORATION ($\bar{Q}_e$) cal / cm^2/day
JULY
1961 – 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-50
-100
-150
-200
-250


HEAT LOSS THROUGH EVAPORATION ($\bar{Q}_e$) cal / cm^2/day
AUGUST
1961 – 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
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130 W.
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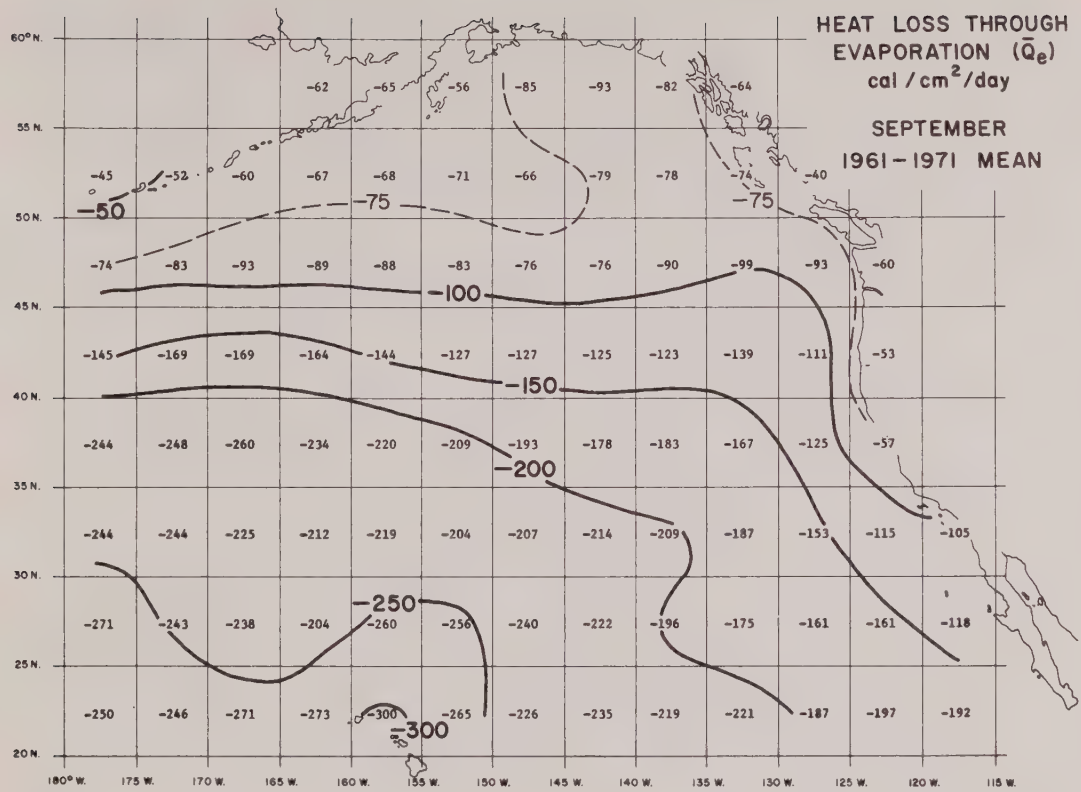
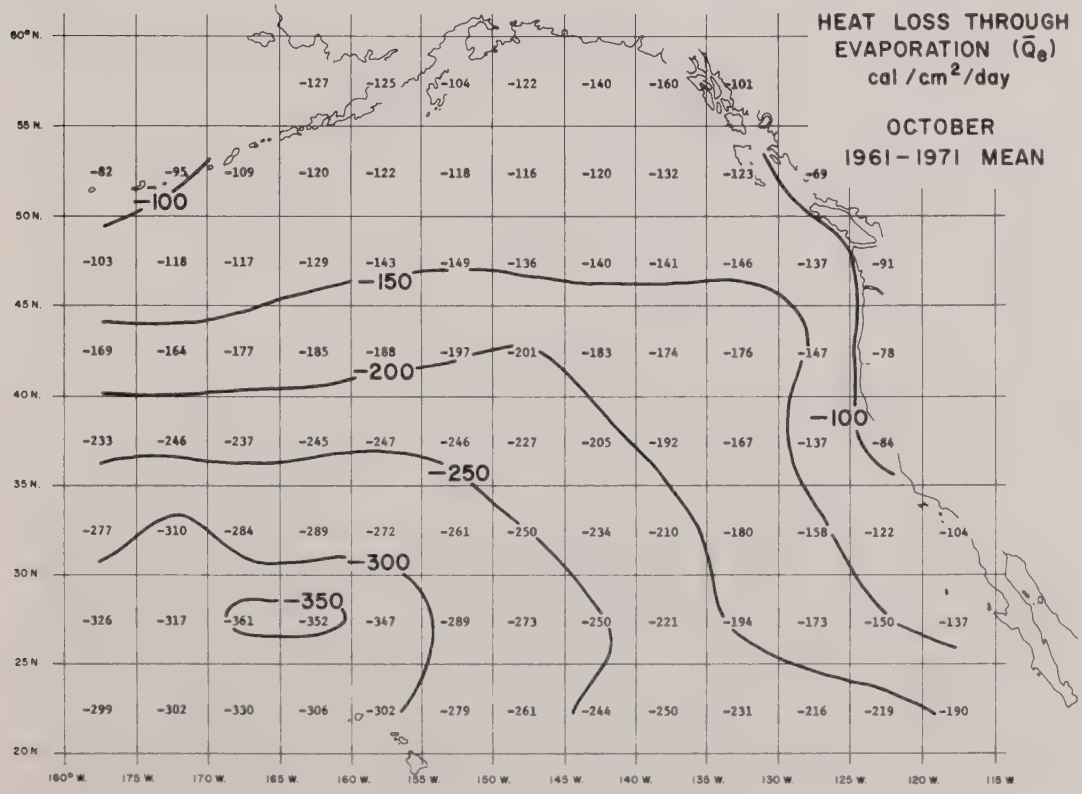
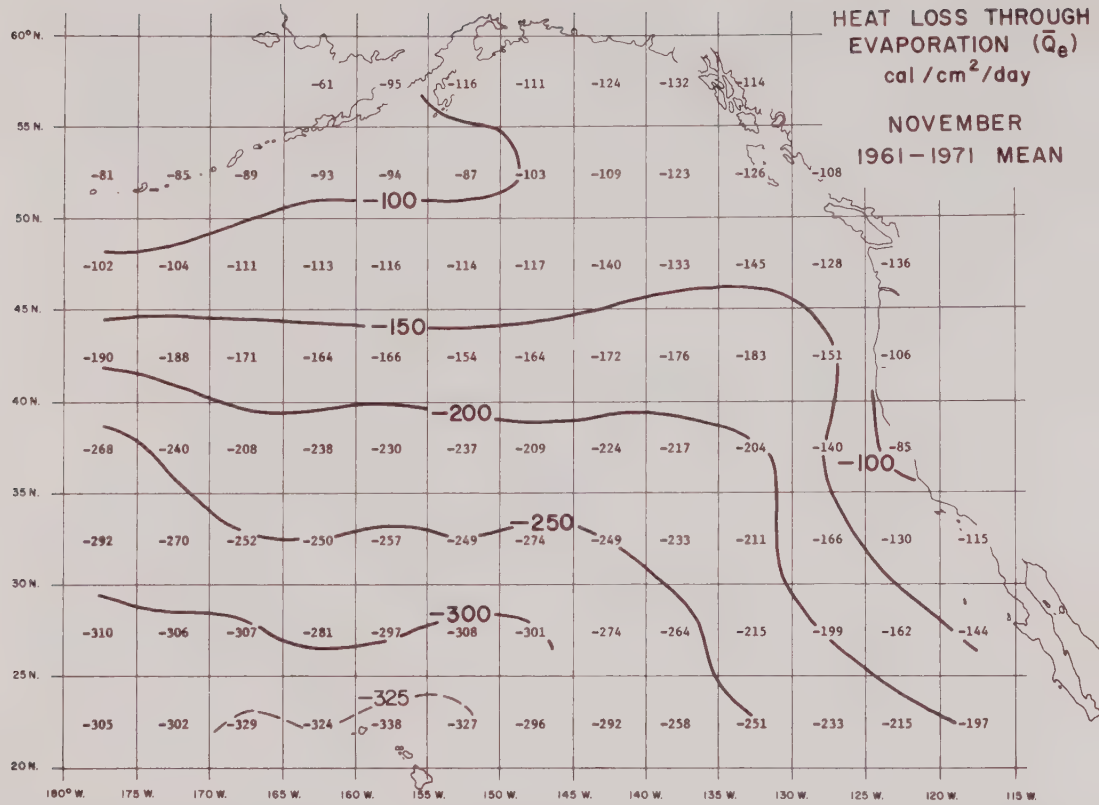
120 W.
115 W.
-25
-50
-100
-150
-200
-250
-275


HEAT LOSS THROUGH EVAPORATION ($\bar{Q}_e$)
cal / cm^2/day
SEPTEMBER
1961 – 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-50
-75
-100
-150
-200
-250
-300


HEAT LOSS THROUGH EVAPORATION ($\bar{Q}_e$)
cal / cm^2/day
OCTOBER
1961 – 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
160° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-100
-150
-200
-250
-300
-350


HEAT LOSS THROUGH EVAPORATION ($\bar{Q}_e$)
cal / cm^2/day
NOVEMBER
1961 – 1971 MEAN
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55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-61 -95 -116 -111 -124 -132 -114
-81 -85 -89 -93 -94 -87 -103 -109 -123 -126 -108
-100
-102 -104 -111 -113 -116 -114 -117 -140 -133 -145 -128 -136
-150
-190 -188 -171 -164 -166 -154 -164 -172 -176 -183 -151 -106
-200
-268 -240 -208 -238 -230 -237 -209 -224 -217 -204 -140 -85
-100
-292 -270 -252 -250 -257 -249 -274 -249 -233 -211 -166 -130 -115
-250
-310 -306 -307 -281 -297 -308 -301 -274 -264 -215 -199 -162 -144
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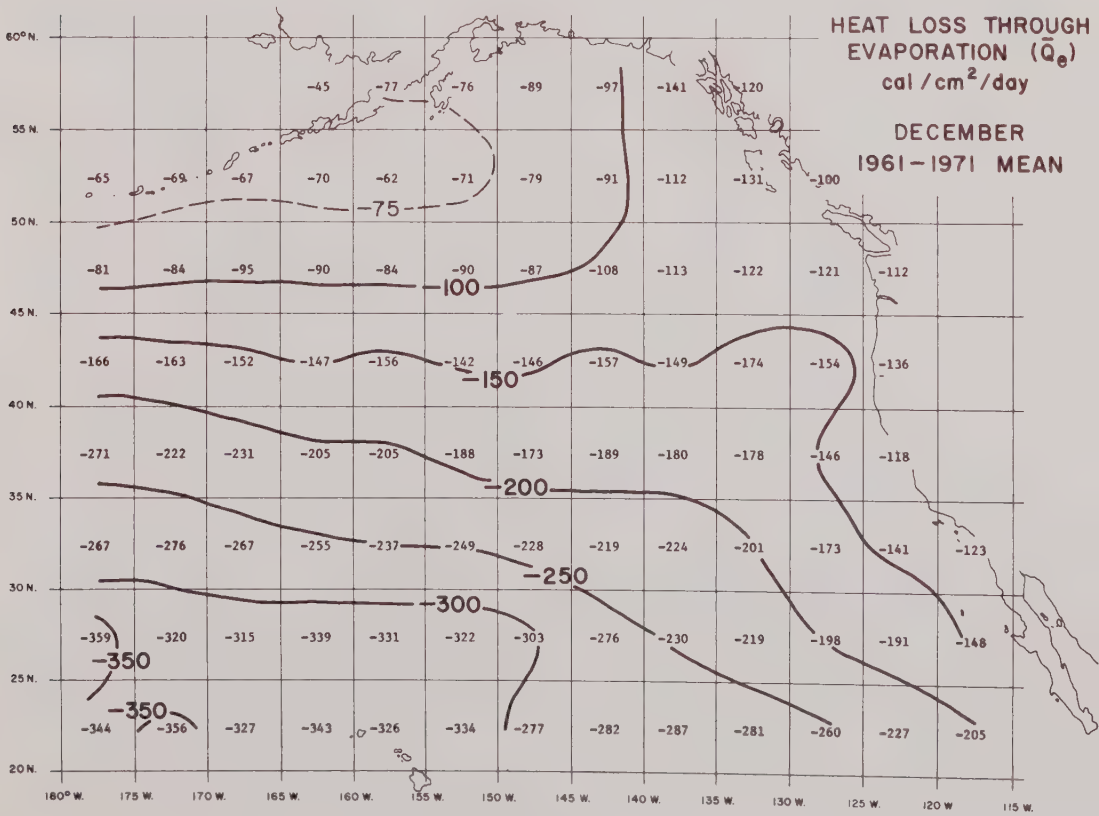
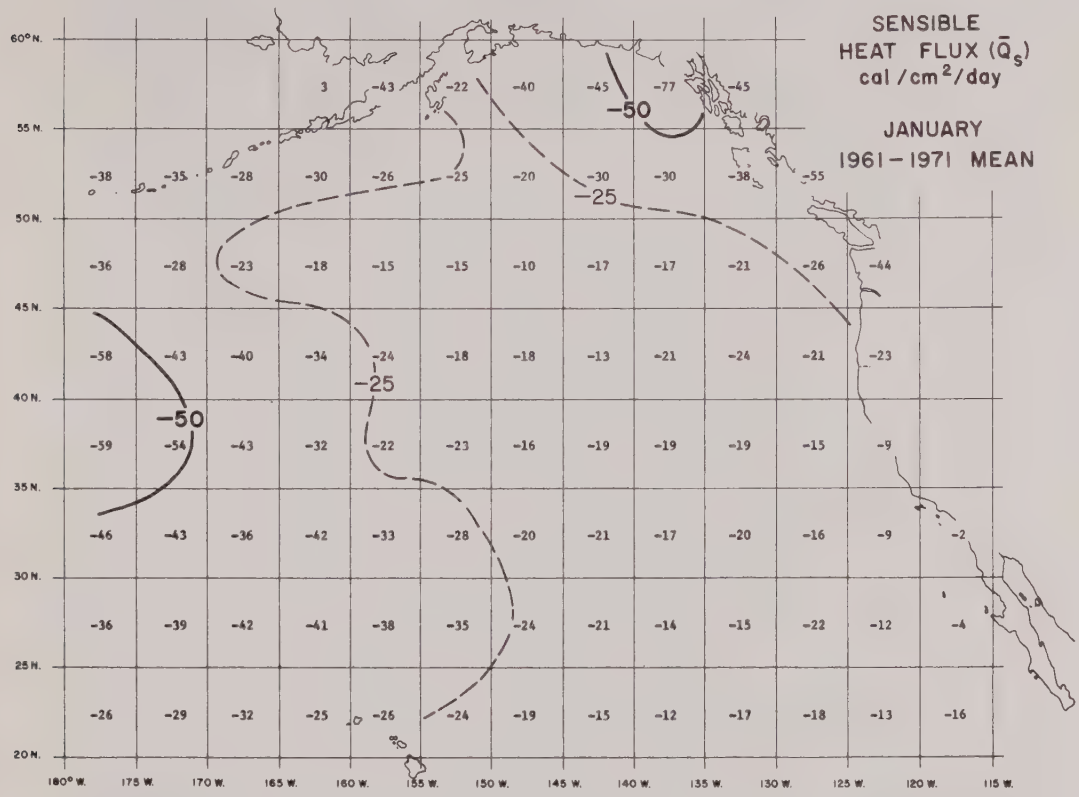
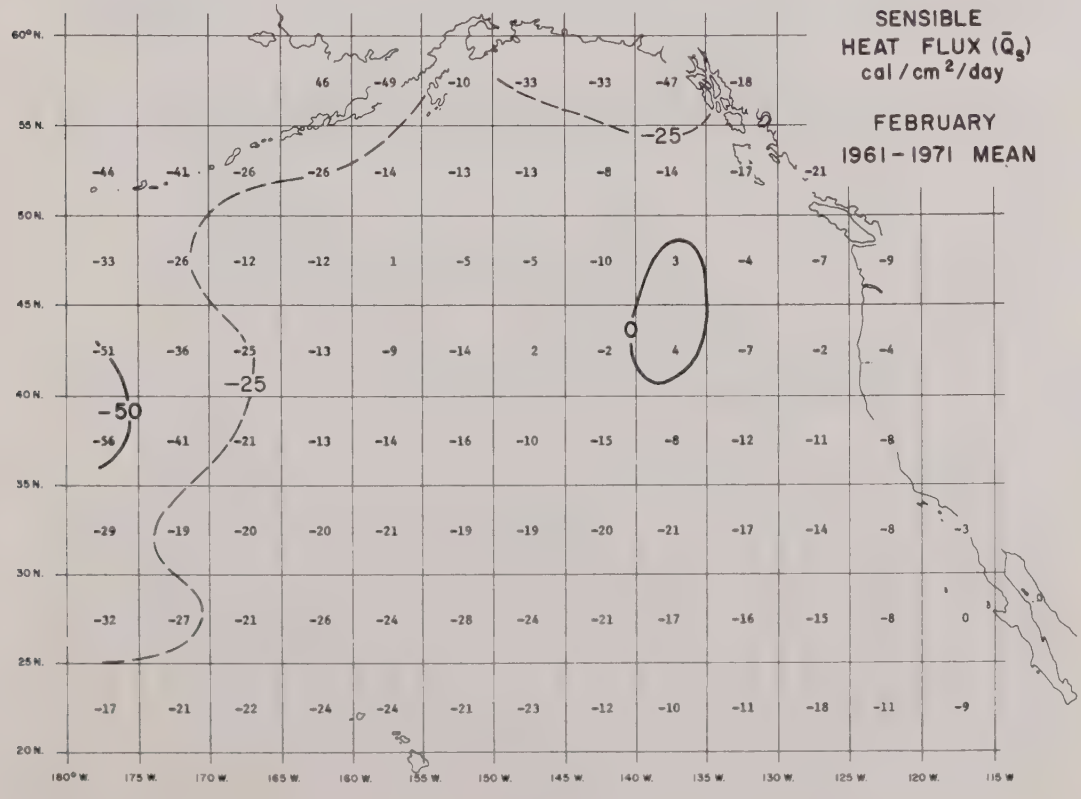
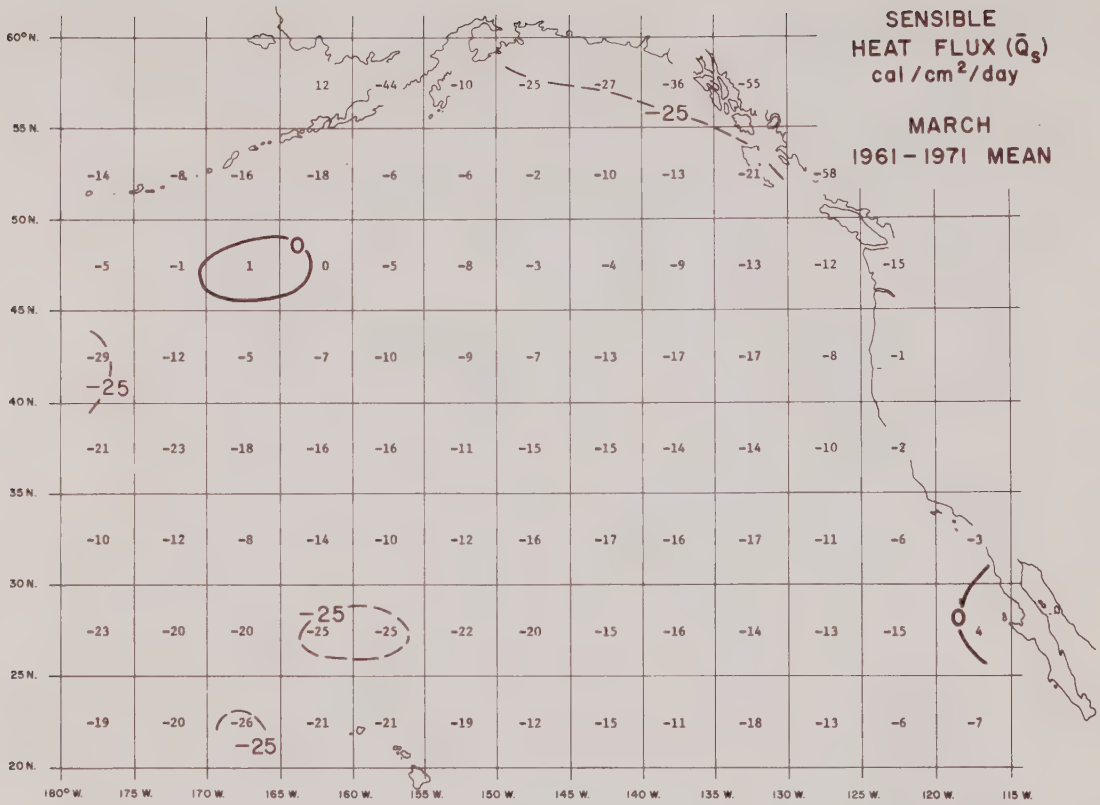
-325

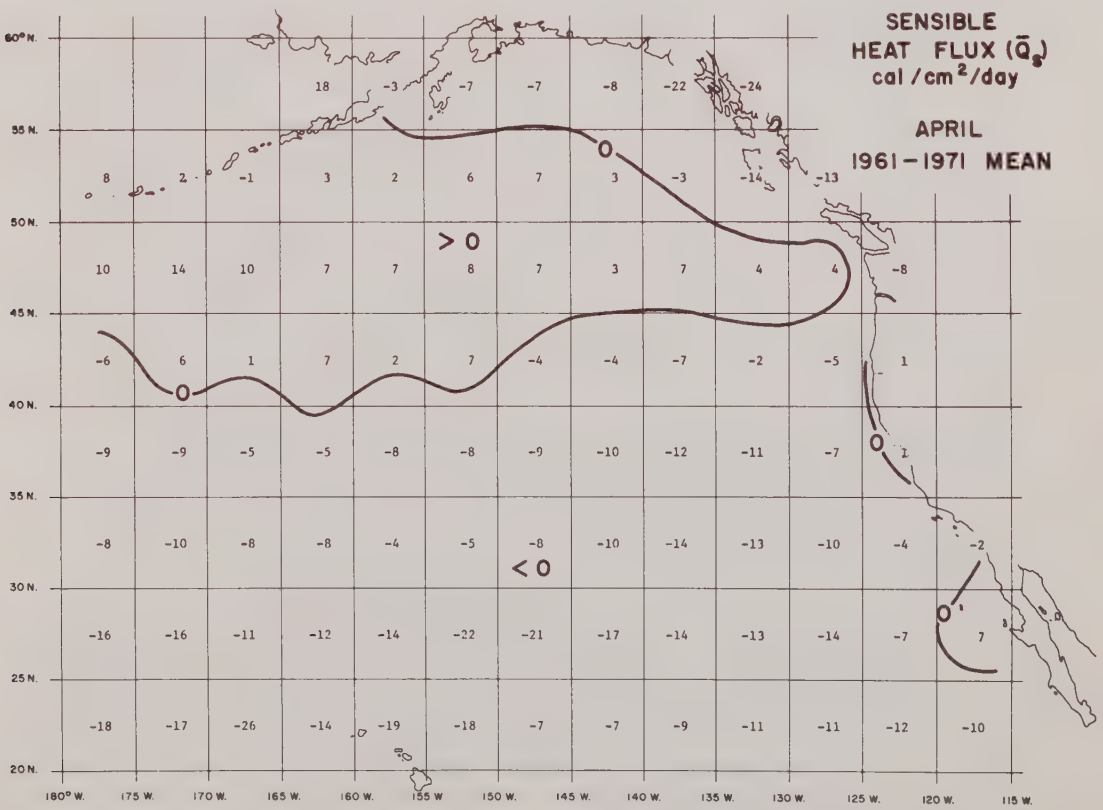

HEAT LOSS THROUGH EVAPORATION ($\bar{Q}_e$)
cal / cm^2/day
DECEMBER
1961 – 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
-45 -77 -76 -89 -97 -141 -120
-65 -69 -67 -70 -62 -71 -79 -91 -112 -131 -100
-75
-81 -84 -95 -90 -84 -90 -87 -108 -113 -122 -121 -112
-100
-166 -163 -152 -147 -156 -142 -146 -157 -149 -174 -154 -136
-150
-271 -222 -231 -205 -205 -188 -173 -189 -180 -178 -146 -118
-200
-267 -276 -267 -255 -237 -249 -228 -219 -224 -201 -173 -141 -123
-250
-359 -320 -315 -339 -331 -322 -303 -276 -230 -219 -198 -191 -148
-300
-350
-344 -356 -327 -343 -326 -334 -277 -282 -287 -281 -260 -227 -205
-350

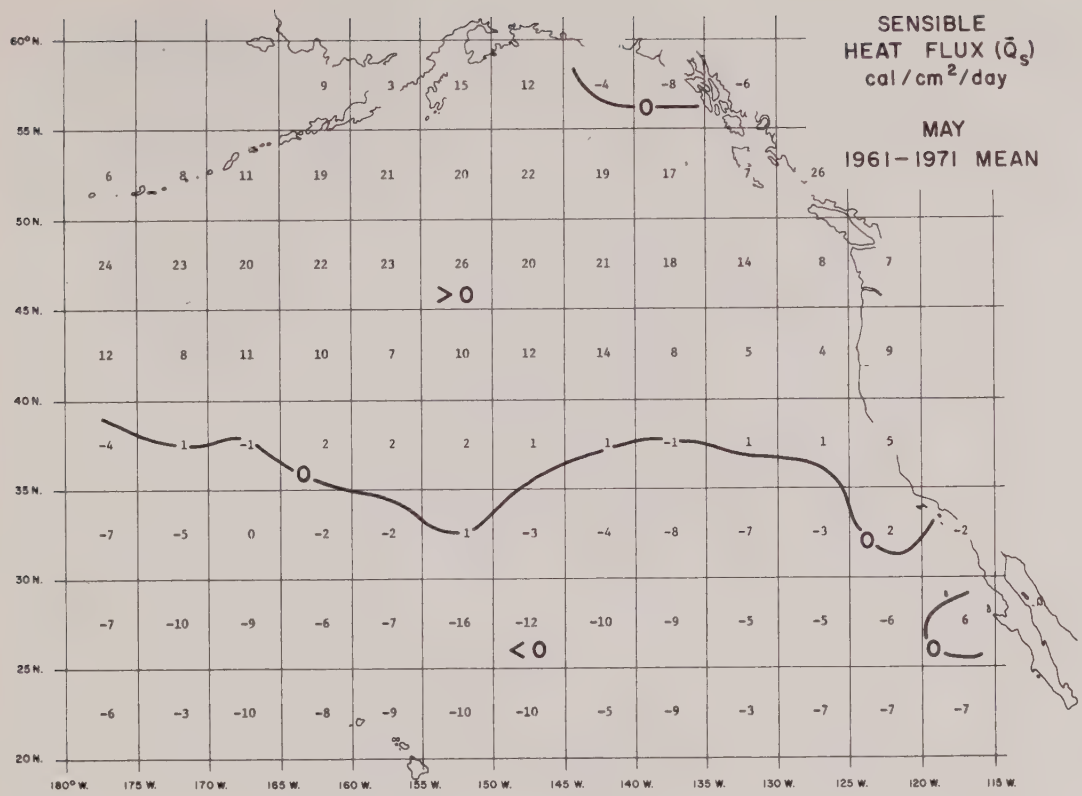
PART 6. SENSIBLE HEAT FLUX 1961-71 MEAN MONTHLY VALUES (NORMALS).

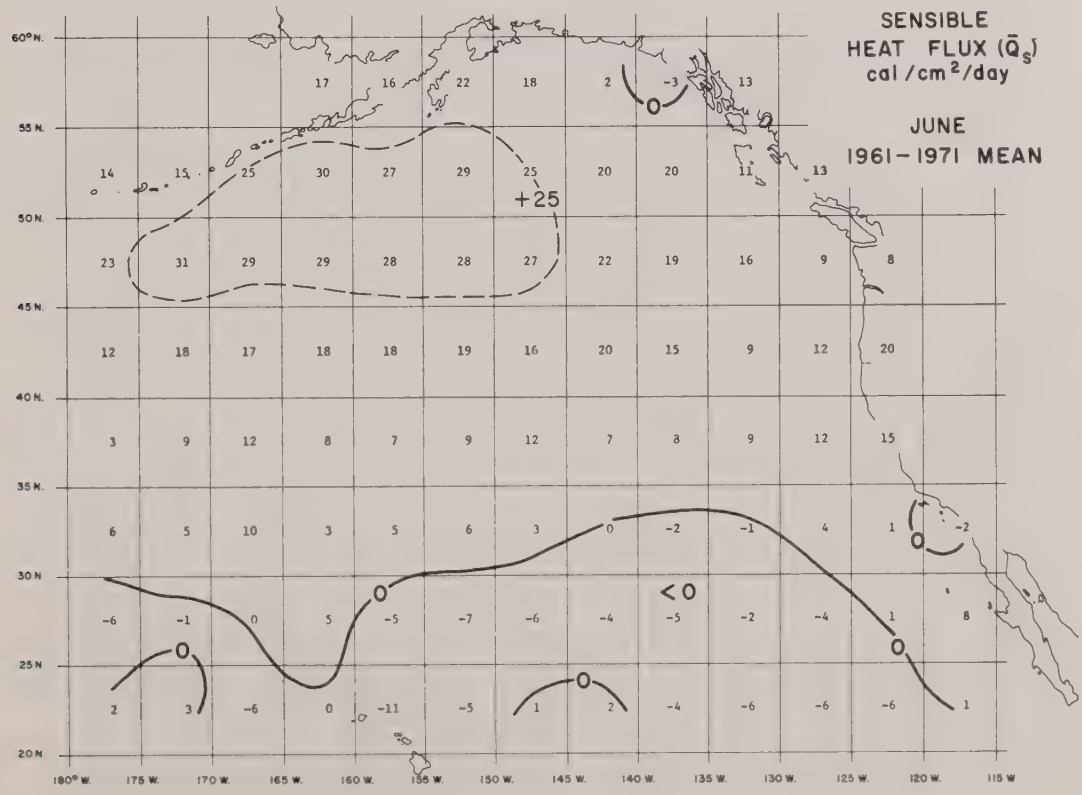


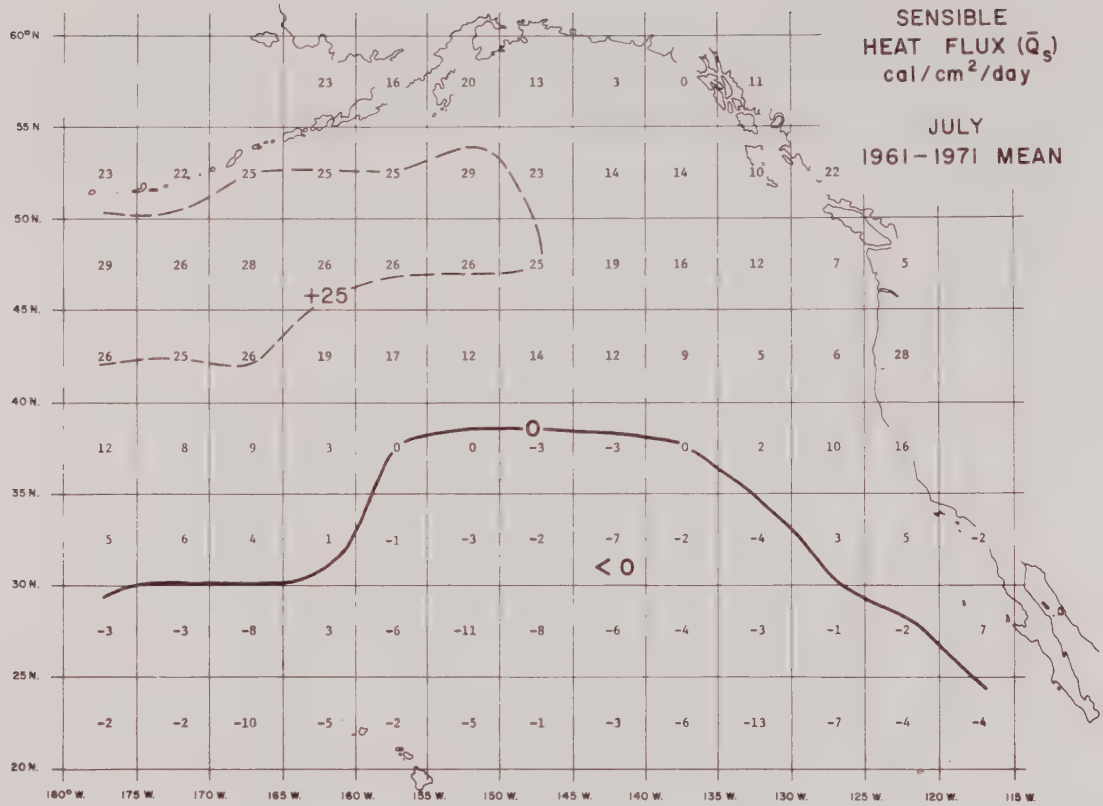


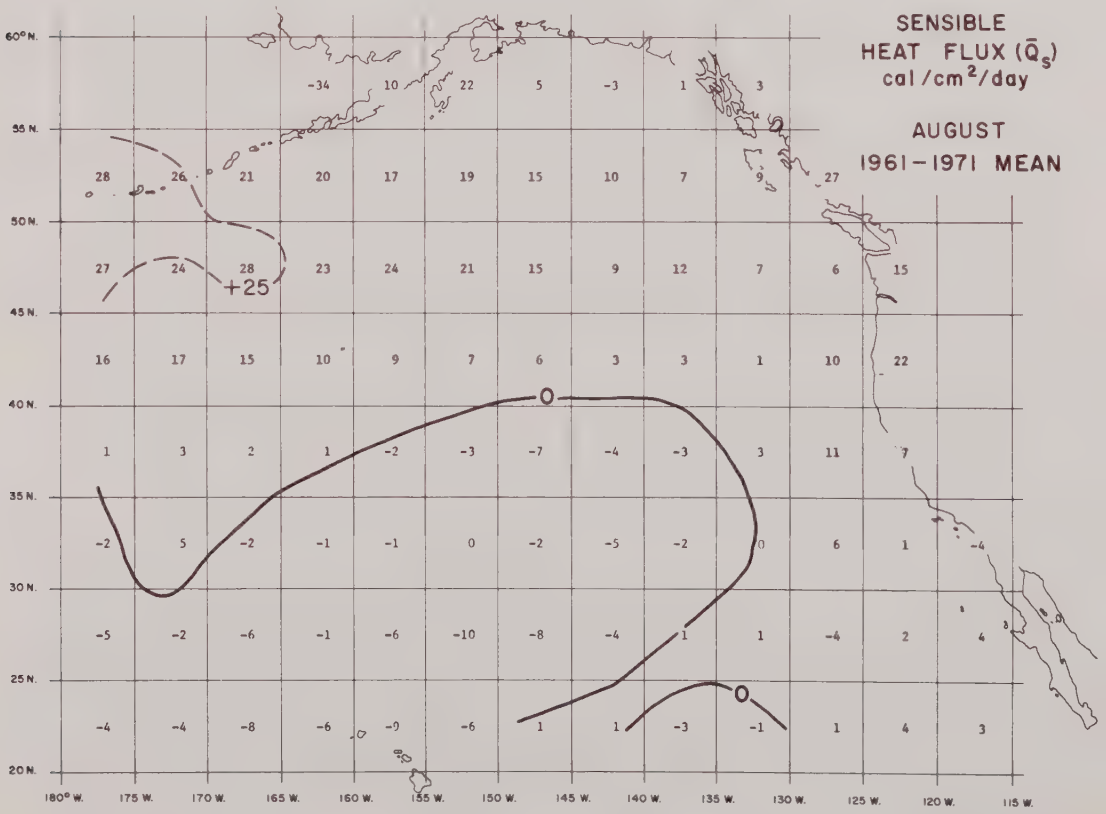

SENSIBLE
HEAT FLUX ($\bar{Q}_s$)
cal / cm^2 / day
MARCH
1961 – 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

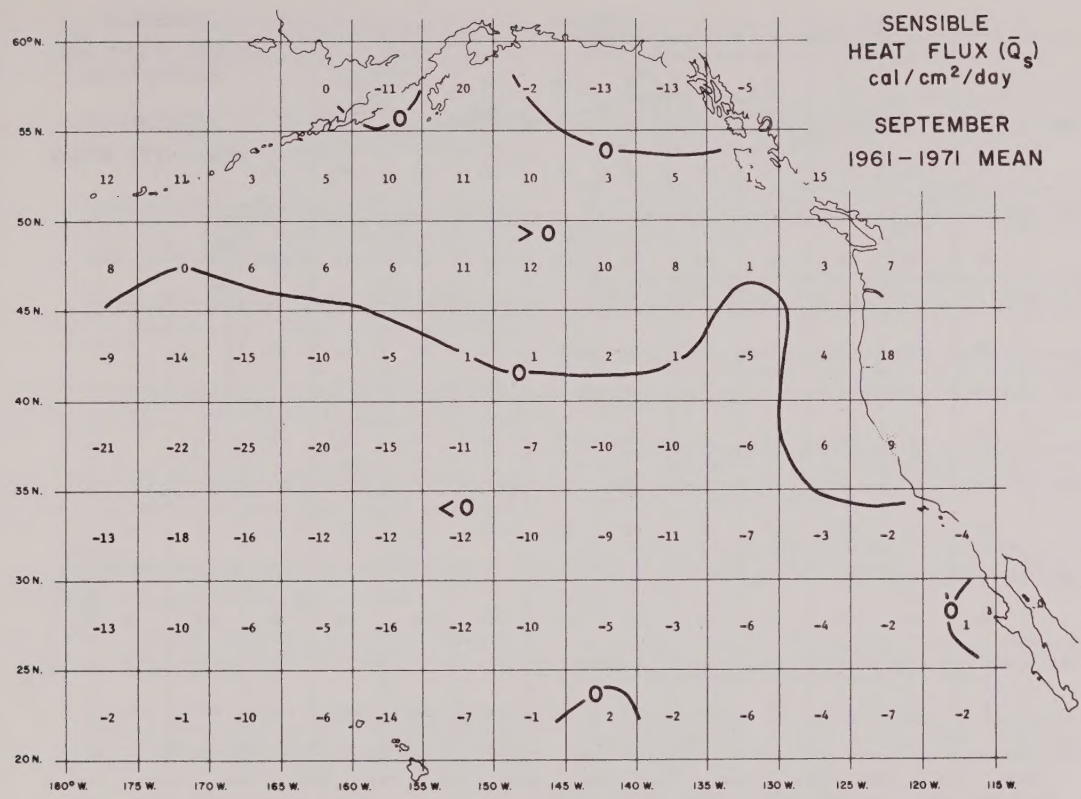

SENSIBLE
HEAT FLUX ($\bar{Q}_s$)
cal / cm^2 / day
APRIL
1961 – 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

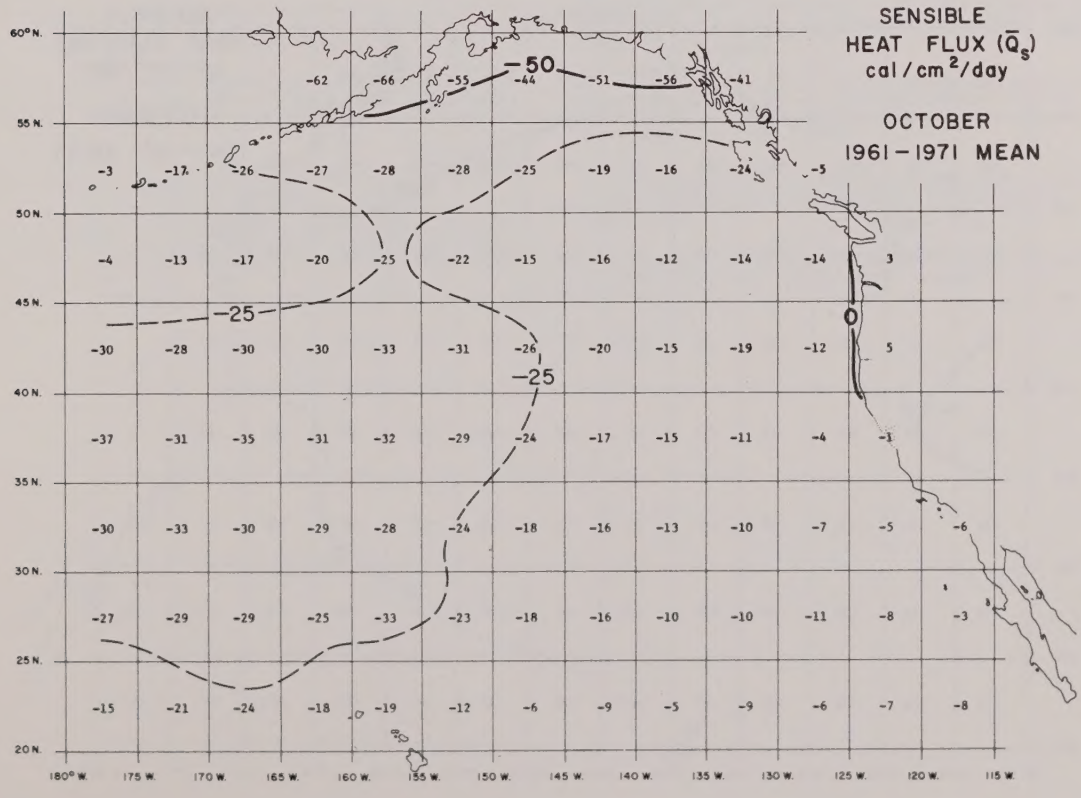

SENSIBLE
HEAT FLUX ($\bar{Q}_s$)
cal / cm^2/day
MAY
1961 – 1971 MEAN
>0
<0
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.


SENSIBLE
HEAT FLUX ($\bar{Q}_s$)
cal / cm^2/day
JUNE
1961 – 1971 MEAN
+25
<0
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W


SENSIBLE
HEAT FLUX ($\bar{Q}_s$)
cal/cm²/day
JULY
1961–1971 MEAN
+25
0
< 0
60°N
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.


SENSIBLE
HEAT FLUX ($\bar{Q}_s$)
cal/cm²/day
AUGUST
1961–1971 MEAN
+25
0
0
60°N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.


SENSIBLE
HEAT FLUX ($\bar{Q}_s$)
cal / cm^2/day
SEPTEMBER
1961 – 1971 MEAN
>0
<0
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.


SENSIBLE
HEAT FLUX ($\bar{Q}_s$)
cal / cm^2/day
OCTOBER
1961 – 1971 MEAN
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
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140 W.
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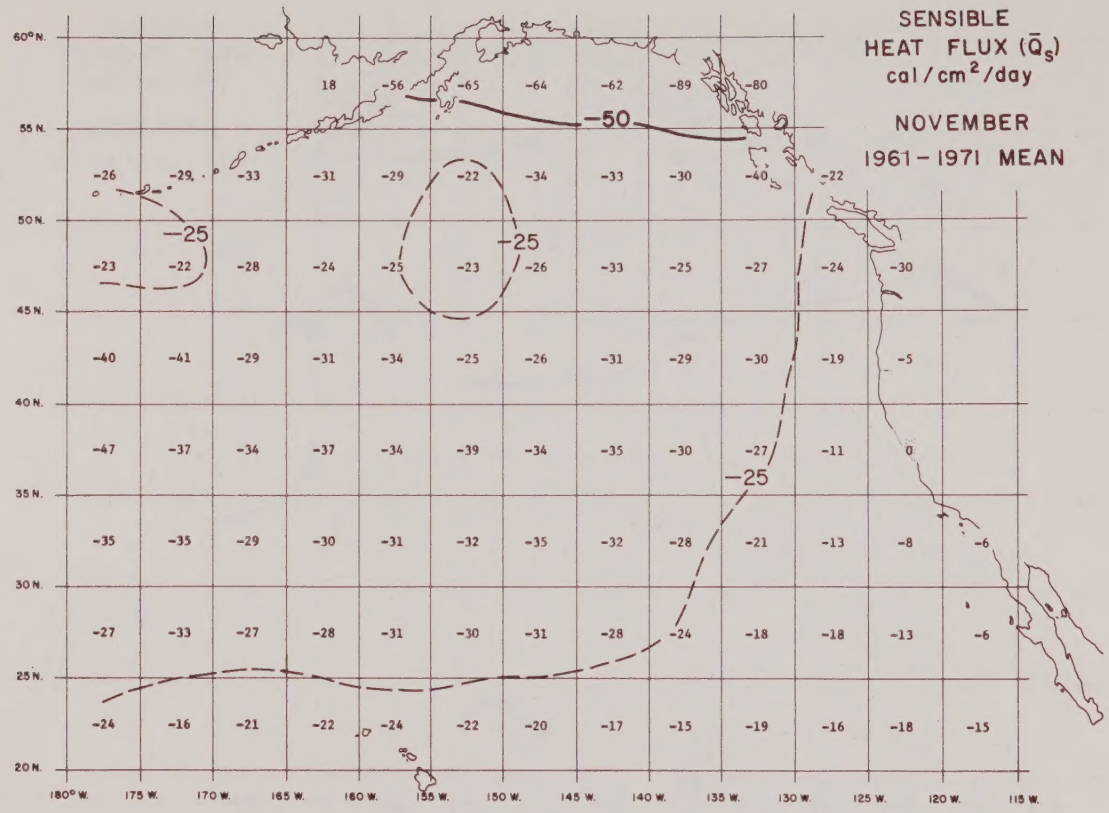
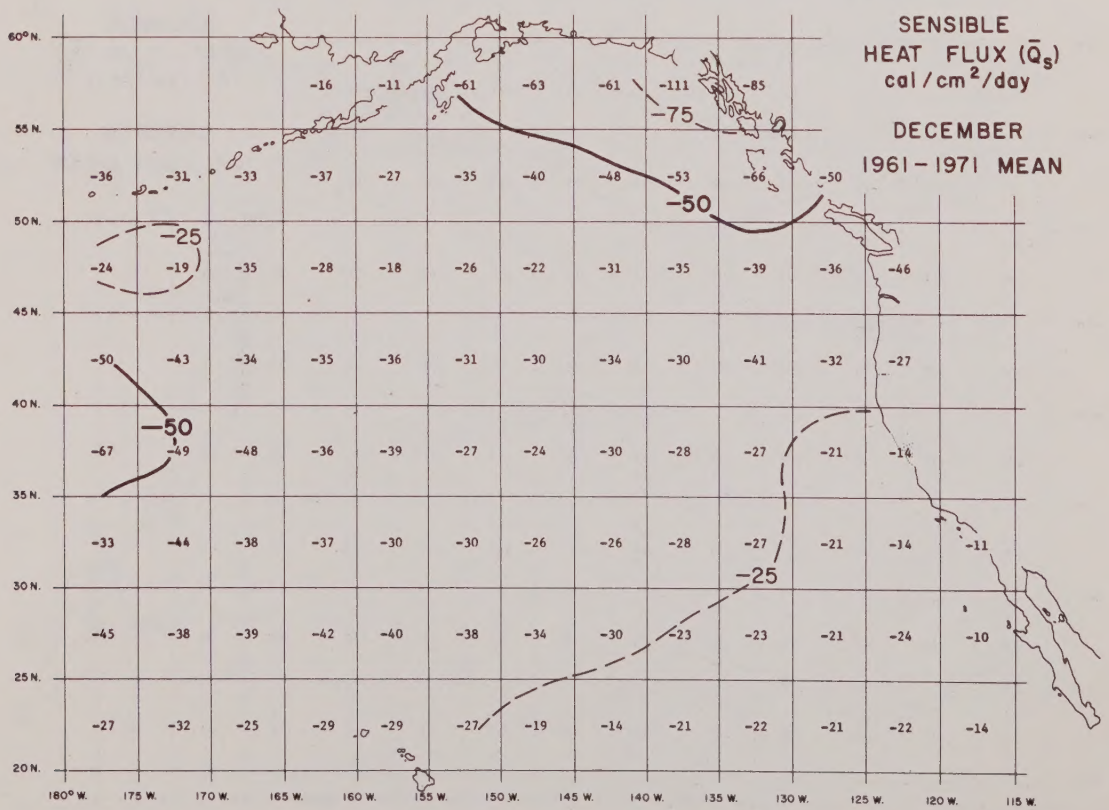
130 W.
125 W.
120 W.
115 W.





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